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COMPUTERWORLD

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Network vendors race to link up IBM's PS/2 machines. Page 49.

Manager of Intel's add-in board division evaluates expansion capabilities of the PS/2 line. Page 39.

Connectivity and 9370 are expected to highlight an IBM announcement on Tuesday. Page 6.

BULLETIN:
RYE BROOK, N.Y. — IBM last week advanced the delivery for two of its most powerful systems, the 3090 Models 600E and 300E, by saying both machines will be available in June. IBM had planned to ship the systems and upgrades from existing models in the third quarter.

IBM launches production-oriented VM/XA

Environment gears mainframes to end users, adds full support for multiple operating systems

BY ROSEMARY HAMILTON
CW STAFF

RYE BROOK, N.Y. — Taking an initial step toward providing a true user-oriented environment for its largest processors, IBM last week announced VM/Extended Architecture System Product, a high-end VM operating system that will supersede current VM/XA offerings.

The announcement is the latest in a series of VM introductions made during the past year that show IBM's intent to position VM alongside its MVS as the strategic operating systems of the future. The introduction also addresses one of the remaining major flaws of VM by offering a production-oriented operating environment on the company's biggest systems to replace the current VM/XA, which is primarily used for support of guest operating systems and development work.

VM/XA SP, scheduled for release in March 1988, reportedly includes some of the major pieces — such as an enhanced Conversational Monitor System — needed to provide an end-user-oriented operating system that will for the first time take full advantage of XA hardware, which includes IBM's 3090s, 3080s and 4381.

"It is a turning point toward a more cohesive environment,"

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Users rate their mainframes

IBM ranks high on reliability among users surveyed in annual Datapro report — **full story page 55**

Reliability of mainframe	*Weighted average*	*Number of responses*
IBM 4381	3.84	335
IBM 3080 series	3.79	233
Unisys A 3/A 5	3.79	53
IBM 4361	3.78	85
Amdahl 580	3.72	29
Honeywell DPS 7	3.72	40
IBM 3090	3.70	85
Unisys 1100/70	3.60	62
Honeywell DPS 8	3.55	38
Unisys A 9/A 10	3.52	40

INFORMATION PROVIDED BY DATAPRO RESEARCH CORP.

Sale of D&B's Nomad2 imminent

BY ALAN ALPER
CW STAFF

NEW YORK — Thomson S.A. of France is negotiating to acquire D&B Computing Services' Nomad line of fourth-generation language productivity tools, *Computerworld* has learned.

The Dun & Bradstreet Co., D&B Computing's parent company, has sought a purchaser for the Nomad line since early this year [CW, May 25] and will spin off D&B Computing's remaining time-sharing and maintenance operations as a separate business unit if the acquisition is completed, sources said.

D&B Computing is believed to have a preliminary agreement with Thomson but is reluctant to publicly disclose the deal until terms are completed, sources knowledgeable of the negotiations said. A Thomson affiliate in France confirmed the negotiations.

A D&B Computing spokeswoman said it is company policy not to comment on reports related to mergers and acquisitions.

The purchase price of Nomad technology is estimated in the $15 million to $20 million range, sources said.

Dun & Bradstreet is believed to be interested in selling Nomad because it does not fit with the firm's information services thrust. In addition, Wilton, Conn.-based D&B Computing is

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Shh! PS/2s to ship out diskless

BY DOUGLAS BARNEY
CW STAFF

IBM is quietly making a diskless version of its Personal System/2 Model 30 available to at least one large corporation, while some firms are using the Model 30 equipped with disk drives to replace terminals.

According to sources within the company, American Airlines will be using diskless IBM Model 30s as part of its Sabre reservation system and will be installing the machines in travel agents' offices during the next few years. Joe Stroop, a spokesman for American Airlines, refused to confirm or deny the report. As of press time, IBM was unwilling to comment.

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CRISIS IN EDUCATION

Top students shunning MIS

BY GLENN RIFKIN
CW STAFF

This is the first of a two-part series.

The burgeoning computer industry of the early 1980s brought with it a surge in MIS education. Programs sprang up on campuses around the country as interest in computer careers soared. But recently, the promise of MIS education has turned sour on America's campuses; the industry slump, coupled with a growing list of diverse and unsettling factors, is resulting in declining interest in MIS as a career and creating a growing crisis in MIS education.

"There's a disturbing feeling that the bloom is off the rose," says Ephraim McLean, associate professor of information systems at the University of California at Los Angeles's Graduate School of Management. "There is the sense among students that there is not a need for MIS professionals and that the action area is not in MIS but in finance. The feeling is that the MIS professional will go the way of the stationary engineer; that there will be some need for a few people in the basement to run the big computers but that, in fact, it is not a very attractive career."

Although McLean, along with MIS educators across the country, vigorously disagrees with that scenario, undergraduate and graduate students across America seem to be embracing that perception. The computer industry slump — although on the wane — coupled with the glamour and lure of lucrative Wall Street careers, is cutting dramatically into what was once a surplus pool of talent for MIS. "We're getting a stronger demand for our students from corporations than in the last two or three

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Product parade. Honeywell Bull releases DPS 8000 line as follow-on to DPS 8 small mainframe family and rolls out an integrated relational DBMS, productivity tools for GCOS 8-based mainframes and models of the DPS 6 Plus mini. Page 8.

NCC news. Although the exhibitor list has been pared down, this week's NCC schedule is expected to include product announcements from IBM, Xerox and others, as well as a few joint marketing venture plans. Page 4.

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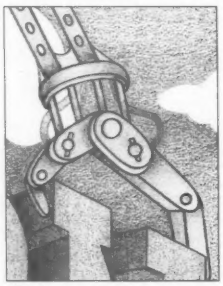

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"There is a whole lot of money riding on Unix not being successful."

STEVE JOBS
NEXT, INC.

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N E W S

Shipments OK'd at top

South Africa deliveries approved by An Wang

BY CLINTON WILDER
CW STAFF

LOWELL, Mass. — Wang Laboratories, Inc.'s use of a Florida export firm to ship products to South Africa in 1986 was an official corporate decision approved by Chairman An Wang, the company confirmed last week.

The decision, made after Wang surrendered its export license to the racially divided nation, grew out of concern for Wang's South African customers, Wang spokesman Paul Henning said. He added that the company, after cutting its direct tie with its Johannesburg distributor in 1985, sought an indirect way to continue supplying its South African users.

Wang shipped its products through Fort Lauderdale, Fla.-based Southern Star Trading Corp. to the South African distributor, General Business Systems (GBS), in 1986 [CW, June 8]. "For 1986, we made the decision to enter into the Southern Star agreement in order to address, in a commercially reasonable manner, the immediate needs of foreign customers who were then operating their businesses with Wang computers purchased over the preceding 20 years," the company said in a corporate statement.

'A transition period'

"Over a period of time, this was consistent with our policy of withdrawal from South Africa," Henning said. "It was a transition period, if you will, for our existing customers in South Africa."

In Wang's 1986 autobiography, *Lessons*, however, the company founder wrote that he had "severed our last remaining connection to South Africa."

The estimated 2,500 Wang user sites in South Africa are still able to purchase Wang products from GBS, according to South African users and a U.S. government official recently interviewed by *Computerworld*. But Henning reaffirmed that Wang ended its remarketing agreement with Southern Star at the end of 1986 and is no longer the source of Wang computers sold by GBS.

PDP-11/84 options to become standard

BY NINAMARY BUBA MAGINNIS
CW STAFF

MAYNARD, Mass. — Digital Equipment Corp. is expected to announce by June 30 a new configuration of the PDP-11/84 that will repackage some options as standard offerings, *Computerworld* has learned.

Functionality that was originally available only with the BA11 backplane and DD11-DK expansion box will soon be available in the CPU, sources close to DEC revealed. DEC engineers have redesigned the PDP-11/84 central processor to make it a more compact and functional system, sources said.

The yet-to-be-announced CPU design will offer more expansion capability in the base system and operate more economically, sources said. The new system will still allow additional expansion boxes and backplanes to hang off of it, providing configuration flexibility and growth capacity, according to sources.

"There is an insatiable demand for more and more PDP-11s, and this new configuration is largely based on feedback from PDP-11/84 users," a DEC source said. DEC refused to comment on the impending PDP-11/84 announcement.

In addition, DEC also said it is now shipping Microvax II upgrade kits for its Micro PDP-11 and Microvax I computers [CW, May 4]. PDP-11/23 Plus, Micro PDP-11/23 and Micro PDP-11/73 users can also upgrade to the top-of-the-line Micro PDP-11/83, DEC said.

The PDP-11 system Microvax upgrade kits are priced from $10,200 to $11,750.

Microvax system upgrade packages cost from $13,400 to $22,400, depending on system configuration.

CLARIFICATION

The Taking Charge column in this week's Management section (page 85) went to press prior to the announcement of the resignation of Richard Ferris, chairman of Allegis Corp., the parent company of United Airlines.

Ferris, who had said he wanted to integrate United Airlines with Allegis's hotel and car rental businesses in a strategy relying heavily on information systems, resigned amid indications that Allegis would sell its hotel and car companies to concentrate on its airline business.

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The Infoloans wait

Long-promised Uccel package now due late '88

BY ROSEMARY HAMILTON
CW STAFF

DALLAS — Uccel Corp. said last week it has missed its original delivery date of a highly complex integrated loans package by almost two years.

The vendor said last week it will not ship its Infoloans product until the fourth quarter of 1988. Customers and industry observers alike had been expecting a delivery date late this year or early in 1988 for Infoloans. However, Donald Steele, general manager of Uccel's Financial Systems Division, said the new delivery date had "absolutely nothing" to do with the pending acquisition of Uccel by Computer Associates International, Inc.

The announcement drew a skeptical response from industry analysts. "Any time any company gives a delivery date that far out, that is the equivalent of being indefinite," said Stephen McClellan, a vice-president at Merrill Lynch & Co. in New York. "The problems with Infoloans are substantial, and that tells me that there's even more likelihood that Computer Associates will divest it," he added.

Delay creates a hassle

The delay creates a problem for customers who had expected delivery at least by the beginning of 1988. "Whatever improvements we were planning for our current applications and then not going to do because of Infoloans, we will now probably have to do," said Michael Paolantonio, a vice-president at Multibank Financial Corp., a banking holding company in Dedham, Mass. "My initial reaction is to stay with Uccel, but we will have to reassess our situation."

Because of the two-year delay — approximately 40 customers placed orders for Infoloans in late 1986 — Uccel will provide temporary fixes at no charge, according to Steele. "We are at fault for the delay," he said. "For those customers who have placed orders, we will be helping them with our current products."

Infoloans is the long-awaited next generation of banking systems. It was designed to combine the commercial-, consumer- and mortgage-lending functions of a bank into one integrated system. Infoloans represents at least a $500,000 investment for banking users. The initial pricing for the software alone was $425,000. In contrast, the individual consumer-loans package starts at $175,000, and the commercial loans package begins at $195,000.

Uccel is at least the third banking software vendor to stumble with the introduction of banking applications. In the early 1980s, Hogan Systems, Inc. struggled to get systems out.

ADR intros PC version of its mainframe 4GL

BY CHARLES BABCOCK
CW STAFF

PRINCETON, N.J. — A fourth-generation language for personal computers with mainframe-style security and recovery features was launched last week by Applied Data Research, Inc. (ADR) as the first in a battery of products aimed at tying departmental users to hosts.

The language, Ideal Escort, mimics ADR's well-established mainframe fourth-generation language, Ideal, and brings features to the IBM PC-DOS environment that were formerly reserved for host environments, said Robert T. Tasker, chief computer analyst with The Yankee Group in Boston.

Ideal Escort's security features use an active data dictionary to define users' access rights to data bases. In addition, data is encrypted to provide local protection. A departmental employee could not walk up to a vacant PC running Ideal Escort and examine another user's data, said Joseph A. Allegra, ADR vice-president for Ideal and Ideal Escort.

In addition, "a complete 'before' image" is maintained on data that can be used to restore the data base in case of system failure, Allegra said.

Ideal Escort requires Release 3.3 of Microsoft Corp.'s MS-DOS or IBM's Personal System/2. It is designed as a multiuser system capable of running on an IBM Token-Ring or PC Net local-area network (LAN) or a Novell, Inc. Netware LAN, an ADR spokesman said.

It is priced at $1,000 per copy for the first 10 copies and $500 per copy for each order beyond 10.

Builds end-user data base

The system has its own relational data base management system and assists in building an end-user data base on its main menu. Ideal Escort's command language is the same as the mainframe version, but applications developed with it cannot be moved up to the mainframe because of different screen painting and reporting facilities.

The Ideal Escort data dictionary, however, can accept definitions from ADR's mainframe dictionary.

Files can be transferred between the Ideal Escort data base and ADR's mainframe DBMS, Datacom/DB, but the transfer requires a third ADR product, the $495 PC Datacom.

Tasker said he was impressed with the security, dictionary and recovery features of the product, but said ADR "hasn't achieved the level of integration" needed for a PC-based partner of the mainframe world.

IBM sticks with NCC, AT&T decides to pass

BY ALAN J. RYAN
CW STAFF

The exhibitor list for the National Computer Conference (NCC), which opens today in Chicago, has been pared by AT&T and several other companies. But while NCC has lost many of its exhibitors this year, mainstay IBM said it would make an announcement at the show. The announcement is expected tomorrow morning.

Among those that confirmed last week they would skip the show are Arete Systems Corp., Charles River Data Systems, Inc., Memorex Corp., Icon Systems & Software and Sequent Computer Systems, Inc. Others that have bailed out are NCR Corp., Britton Lee, Inc. and Intel Corp.

While many smaller companies said IBM's presence is important to the success of NCC and that an IBM product announcement is a drawing card for users, some observers said IBM's faith in the show may be waning. An IBM spokeswoman said last week that the company would also make an announcement tomorrow morning at the company's building in Manhattan.

Late last week, an NCC spokesman said 147 exhibitors were expected at the show and that the Chicago location is expected to provide a strong local attendee draw to the show. Area contacts said NCC has been flooding the area with incentives and discounts to encourage attendance.

Of those companies exhibiting at the show, few are expected to make significant product announcements. Many companies, such as Fifth Generation Systems, Inc., Kurzweil Computer Products, Inc. and Sorbus, Inc., said they are content to show their old product lines or products that were unveiled at Comdex/Spring '87 two weeks ago in Atlanta.

Oracle Corp. and Sequent reportedly will use NCC to announce a comarketing agreement under which the companies will exchange technical personnel in an effort to port Oracle's relational data base system to Sequent's parallel processors. Oracle also is set to announce value-added reseller agreements with several companies.

Xerox Corp. said it plans to acknowledge the 10th anniversary of the introduction of its 3700 laser printer with enhancements for that printing system, including software to support job queuing and channel attachments for IBM mainframes.

Companies prepared to release products this week at NCC also include DSC Nestar Systems, Inc., which should announce a T1 digital network product and new LAN products. The micrographics products division of Canon U.S.A., Inc. reportedly will take the wraps off its Multi Format Digital Scanner System..

Senior Editor Jim Connolly contributed to this report.

NCC departures

Major vendors that shelved plans to attend this year's show

CW CHART: MITCHELL J. HAYES

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415/328-8064
Jeffry Beeler, Chief
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Midwest
312/827-4433
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IDG News Service
Susan Blakeney, Director

Main Editorial Office
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171
617/879-0700

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Netview and 9370 to top IBM agenda

BY STANLEY GIBSON
CW STAFF

Developers and industry analysts are anticipating significant 9370 connectivity and Netview announcements from IBM tomorrow.

IBM is holding a product announcement session for consultants and the press Tuesday in New York, some two weeks before the 9370's scheduled availability date of July 1.

The 9370 communications products, many of which were promised during an IBM consultants briefing this spring, will be necessary to the departmental processor's success, observers said.

Last week, IBM foreshadowed this week's Netview announcements by saying at the National Networks Conference in Washington, D.C., that Netview and Netview PC will be participating in Systems Application Architecture (SAA).

Kevin Gould, as 9370 project manager with Computer Corp. of America in Cambridge, Mass., said he has received indications from IBM that the 9370 announcements will include extended PU2.1 support, full LU6.2 support under the company's VM operating system and CCITT X.25 packet-switching support. Gould said that IBM also mentioned that a distributed form of Netview could be expected in the future.

"I hope it's what I think it is. A lot of European customers are interested in X.25 support," Gould said. IBM executives in recent weeks have said they intend to respond to customer requests for X.25 enhancements "very soon."

Frank Dzubeck of Communications Network Architects, Inc. in Washington, D.C., said IBM personnel indicated that the company would make similar announcements, along with graduated pricing for Netview. The LU6.2 implementation for 9370s could be accessed under "normal VTAM," Dzubeck said.

Silverlake project

Despite widespread industry predictions that IBM's Silverlake project, merging the System/36 and 38 processors, will not be unveiled until later this year, at least one large System/36 user said he suspects the announcement is imminent.

The new system is cheaper and faster than a System/38 and "looks like a 9370 with the System/38 processor card dropped in," he said.

IBM has wrapped ease-of-use features around the System/38's operating system to make it as easy to use as a System/36, the user said.

Rudolf Strobl, an industry analyst with Arthur D. Little, Inc. in Cambridge, Mass, said IBM could offer a T1 switch made by Network Equipment Technologies. That firm announced last week it had signed a remarketing agreement with IBM and that further details of the agreement will be announced shortly.

Strobl added that IBM would announce the intention of Netview support under the company's OS/2. He added that a distributed Netview would make mid-range processors capable of acting as Netview nodes.

A new era for VM/XA shops

BY JEAN S. BOZMAN
CW STAFF

The sweeping VM Extended Architecture (VM/XA) announcements made by IBM last week begin to meet demands for large-scale interactive processing on a wide range of previously batch-oriented mainframes, industry observers concluded late last week.

IBM executives last week outlined the scope of their commitment to VM. Daniel Colby, manager of IBM's Data Systems Products Division, and Edward Altman, general manager of IBM's Data Systems Division, both stressed the potential of VM and its ability to act as a common environment for all IBM mainline machines, according to analysts.

The increasing use of VM throughout the IBM line, coupled with VM/XA's ability to support four guest operating systems simultaneously, will allow users to do away with dedicated test and development machines, if they so choose. Under the new option, users can allow MVS/XA, VM/XA, DOS/VSE and IX/370 Unix to run side by side, and the mainframe can dynamically reallocate memory, as it is needed, as users log on to the guest systems.

'More computers to a box'

"The benefit of being able to run MVS and VM on the same machine is principally economic," said Romney White, president of VM/CMS Unlimited, Inc., a Boston-based software house that sells VM products. "IBM is giving you a way to get more computers in one box." Large users may find themselves allowing a wide variety of jobs to be supported on IBM 3090 Model 400E or 600E complexes instead of maintaining separate IBM 4381 machines for information center- and development-related functions, White said.

A key to this ability is full support of VM/CMS — something formerly available only under VM/SP — under VM/XA. "It sounds like IBM is finally going to let users take real advantage of the XA," White said, "because the power of VM is, for most users, in CMS."

He added that CMS supports many critical interactive applications, including IBM's Professional Office System, Information Builders, Inc.'s Focus development language and graphics packages.

CMS gives IBM mainframes, at one time optimized for their batch abilities, an interactive flavor that is similar to Digital Equipment Corp.'s VMS operating system, analysts said. Each user is given his own virtual machine under VM/CMS, but the former limit used to be about 1,200 virtual machines per copy of VM. Now, with 31-bit addressing and the use of IBM 3090 multiprocessors, the number should rise significantly, although IBM did not specify just how many VM/CMS users it would support under VM/XA SP.

'Single-system image'

Last week's announcements offer MIS more configuration choices to serve their VM/CMS users, said Peter Levine, a senior analyst with the Gartner Group, Inc. in Stamford, Conn. The extension of VM/ISF from two to four processors provides users with "a loosely coupled solution, under which any user can log on to any of the connected machines and reach any application," Levine said. "With the extension of VM/XA, users can also choose to use 31-bit VM/CMS on a group of tightly coupled processors and, by definition, get a single-system image."

Another fundamental change indicated in last week's IBM announcement is the ability to dynamically repartition system memory to various guest operating systems under the Multiple High-Performance Option. The capability resembles, and some observers said, surpasses, a similar mainframe feature found on Amdahl Corp. machines, which is called the Multiple Domain Facility.

Over the long term, according to Steve Josselyn, program manager for end-user services at International Data Corp. in Framingham, Mass., users may find there will be some crossover in function between MVS/XA and VM/XA. But the differences between the two operating systems remain.

"MVS is best suited for a large batch environment, and VM is still geared toward the test, development and operating system migration environments," Josselyn said. "But the addition of VM/XA SP means that IBM is building in the direction of having one operating system run across its entire line."

D&B sale

FROM PAGE 1

not believed to have performed up to financial expectations.

Nomad accounted for about $20 million in licensing and maintenance revenue last year, observers estimated. D&B Computing's time-sharing and software maintenance business also brought in approximately $20 million in revenue, according to industry estimates.

Dun & Bradstreet said it does not break out individual performances of its subsidiaries and operating units. The firm is believed to have spoken to a number of software concerns regarding the purchase of D&B Computing or Nomad technology, including On-Line Software International, Inc.

Thomson, a leading Paris-based electronics, computer and communications equipment manufacturer, has been interested in expanding its presence in the U.S. software market for some time, according to industry insiders. The firm reportedly was outbid last fall by On-Line Software to buy Ramis from Martin Marietta Data Systems, Inc. [CW, Oct. 6, 1986].

The French firm established a beachhead in the U.S. software business about seven years ago through the founding of a consulting company, United Software Systems & Services, Inc., that operates under the monicker U3S.

Located in Princeton, N.J., U3S consults on the use of a variety of fourth-generation language data base management systems, such as Ramis, Information Builders, Inc.'s Focus, Cullinet Software, Inc.'s IDMS/R and Nomad.

U3S is managed by Executive Vice-President Frank Fish, a former executive at Mathematica, Inc., which developed Ramis and was acquired by Martin Marietta. Fish, who joined U3S last summer, reports to another Thomson software affiliate in France called Sysca.

Sources said Thomson plans to use U3S as the vehicle to acquire Nomad. U3S would probably have to hire D&B Computing personnel to continue to enhance, market and support Nomad, sources speculated. Fish declined to comment on the report, but a Sysca spokesman confirmed negotiations. Industry sources said an agreement could be announced this week.

Nomad attributes

The centerpiece of the Nomad product line is Nomad2, a relational fourth-generation language DBMS used primarily in IBM mainframe environments. Nomad2 is installed in approximately 500 information and applications development centers and has a user base of more than 100,000, a company report says.

In the highly competitive fourth-generation language market, Nomad ranks third behind Focus and Ramis, according to a June 1986 report published by International Data Corp., a Framingham, Mass., market research firm.

D&B has another software subsidiary, McCormack & Dodge Corp. (M&D), which is believed to have posted revenue of about $120 million last year.

Some analysts said they believe M&D may be on the selling block, as it too is not part of Dun & Bradstreet's information services strategy and has been marginally profitable.

"It does not fit at all," noted Tom Lawton, publisher of "The Computer Services Report" in Belmont, Mass. "It would be sticking out like a sore thumb. It's not a question of if it's going, it's just a question of when."

At a Glance

D&B Computing Services

D&B a company of The Dun & Bradstreet Corporation

Employees: 200*
Revenue: $40 million to $80 million*
Product: Nomad II fourth-generation language and related Nomad products, which account for half of revenue
Services: Time-sharing, software maintenance, facilities management
* Estimated

VM/XA

CONTINUED FROM PAGE 1

said Steve Josselyn, program manager for end-user services at International Data Corp. in Framingham, Mass. "VM is now the only operating system that can be run across the entire IBM 370 line — from the IBM Personal Computer to the IBM 9370, the 4381 and the 3090."

The announced software also has a feature that increases the number of preferred guests from one to four. However, another critical piece, native IBM Systems Network Architecture support, reportedly will not be available until first-quarter 1989; it is slated for availability with the second release of VM/XA SP.

VM/XA SP topped a list of other VM announcements made late last week. IBM revamped its not-yet-released Inter-System Facilities software for the VM/XA SP High Performance Option (HPO) environments by increasing from two to four the number of processors that can share resources. The company also announced enhancements for VM/XA System Facility (SF), the current VM/XA offering that VM/XA SP is intended to replace.

Carl Jerami, director of MIS for Time, Inc.'s Magazine Group in Chicago, said the announcement will not impact his operation immediately but that "down the road, if IBM keeps announcing more and more VM packages for development, we're going to be looking at them." Although Time's new data center in Tampa, Fla., will be running entirely under IBM's MVS/XA when it opens in the fall, Jerami added, this will "provide us the opportunity to segment the processor into several environments without committing to buying additional machines."

In a related announcement, IBM doubled the expanded storage capacity of its 3090 Models 400E and 600E to 2G bytes. That move was tied to the VM announcements of the Multiple High Performance Guest Support, which would allow four preferred guest operating systems to allocate the expanded storage.

William L. Wilson, group director of large-system management at IBM, said the enhancements to VM/XA SF indicate the vendor will not immediately discontinue the current VM/XA offering. But, he added, "I wouldn't count on future enhancements to the VM/XA SF product."

Buy now, pay later

IBM seems to want to migrate users to the new version of VM/XA as soon as possible. Users who purchase the operating system in 1988 do not have to begin payments until 1989, Wilson said.

Those payments will be a substantial improvement for IBM's revenue on high-end VM operating systems. The current VM/XA offering, VM/XA SF, carries a one-time charge of $11,220. The monthly license fee for VM/XA SP is $4,500. Graduated one-time charges are also available. Prices for the smaller VM/XA systems in IBM's Group 30 category, such as the 4381, are $112,500. For the high-end Group 40 systems, such as the 3090s, users are charged $216,000.

The extension of a graduated pricing scheme to the VM/XA products means that large-system users will pay up to 80% more for large-scale systems software under VM/XA SP Releases 1 and 2 than they have paid under MVS/XA, said Bob Djurdjevic, president of Annex Research, Inc. in Phoenix.

"VM/XA's pricing is going to be the lead point of the announcement for many end users," Djurdjevic said, "because it represents a 50% plus increase for IBM 3090 users. Initially, users will only pay about 10% more for VM/XA SF, which is shipping on June 26, but VM/XA SP Release 1, which is shipping next March, has prices that are as much as 80% over what users have been paying for MVS/XA systems software."

The primary benefit to the latest VM/XA product is that it can exploit the extended architecture. By doing so, the system can support a larger number of users while also allowing them to execute larger application programs, Wilson said. Previously, users were confined to a 16M-byte limitation of virtual storage. The new architecture expands that capacity to 2G bytes.

The vendor would not say how many users the new CMS will support. The current high-end production system, VM SP HPO Release 4.2, has a limitation of approximately 1,000 to 1,200 users. Peter Levine, a senior analyst at the Gartner Group, Inc. in Stamford, Conn., estimated that the new operating system could support up to three times that limit.

This operating system, according to IBM's Wilson, would provide users with new limits: 256M bytes of main memory, up from 64M bytes; 2G bytes of virtual storage, instead of 16M bytes; and 128 channels, instead of 32. Access to these resources results primarily from the enhanced CMS.

In the current VM/XA environment, the control program portion of the operating system supports the extended architecture, thereby allowing it to run on the large systems, but the CMS portion does not. As a result, the current VM/XA runs on large systems primarily to support guest operating systems.

The current VM/XA offering with the 24-bit CMS could not be used to run common applications while also supporting a large number of users, an IBM spokesman said.

IBM also said it has included a bimodal capability in this CMS that will allow both 24-bit and newer 31-bit applications to run under VM/XA SP.

Midwest correspondent Jean S. Bozman contributed to this report.

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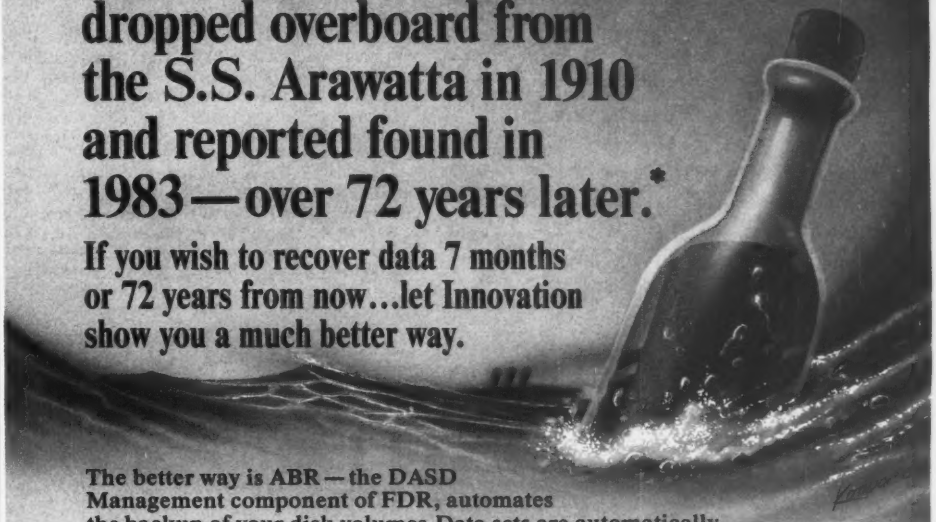

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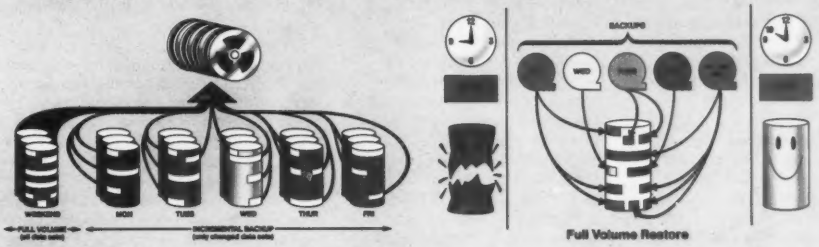

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Honeywell intros keep coming

Small mainframe follow-on, DBMS, minis spill from product bag

BY JAMES CONNOLLY
CW STAFF

BILLERICA, Mass. — Honeywell Bull, Inc. last week extended its string of product announcements, launched in the wake of a corporate reorganization, with software and hardware introductions that affect four of the company's key product lines.

The company announced a successor to its DPS 8 small-mainframe family, an integrated relational data base management system and productivity tools for its GCOS 8-based mainframes (see story at right) and new models of the DPS 6 Plus minicomputer.

The products, analysts noted, apparently had been under development but were delayed during the months when Honeywell, Inc., Compagnie des Machines Bull and NEC Corp. were negotiating the joint venture that turned Honeywell Information Systems into Honeywell Bull, Inc. in March. Earlier introductions included the replacement of the mid-range DPS 7 family with the DPS 7000 in April.

'In the pipeline'

"These are things that were well developed in the product pipeline prior to a year ago," said analyst Don Bellomy of the Framingham, Mass.-based market research firm International Data Corp.

Bellomy noted that the challenge for Honeywell Bull will be to develop future generations of products — particularly software — that can distinguish the company's hardware offerings.

Analyst Chuck White of the Gartner Group, Inc. in Stamford, Conn., reported that the DPS 8000 provides almost 50% better price/performance and reliability for DPS 8 users.

He estimated that 1,200 DPS 8 systems are in use worldwide and that Honeywell Bull can ship about 1,300 DPS 8000-class systems in the next six years.

The two models of the DPS 8000 series are pitted against the high end of IBM's 4381 family and three low-end models of IBM's 3090 mainframe family.

The DPS 8000/81 uniprocessor and the DPS 8000/82 fault-tolerant dual-processor are scheduled to be available in December.

Honeywell Bull officials said a three-CPU model and a four-CPU version will be announced in 1988 for delivery by the end of that year.

The DPS 8000 is the entry point for the GCOS 8 environment. Base prices range from $675,000 to $1.3 million, compared with base prices of $1.85 million for the DPS 88 and $3.55 million for the DPS 90.

As with the DPS 7000, Honeywell Bull is aiming the DPS 8000 at transaction processing, although company officials said buyers are unlikely to be confused by that similarity. The DPS 8000 was designed as a corporate host in a higher performance range, and the DPS 7000 is intended for vertical markets such as manufacturing and medical applications, particularly in office environments.

Honeywell Bull claimed the DPS 8000/81 provides from 2½ to five times the batch performance and three times the transaction processing of the DPS 8/49. The DPS 8000/82 is rated at 1.8 times the performance of the DPS 8000/81.

Comparing the systems with IBM products with similar batch performance, Honeywell Bull claimed a 2-1 advantage in transaction processing as well as price.

Honeywell Bull rated the DPS 8000/81 at 60 transactions per second and the DPS 8000/82 at 110 transactions per second.

Analyst Van Weathers, of the San Jose, Calif.-based market research firm Dataquest, Inc., noted those transaction figures position Honeywell Bull to compete with transaction processing-oriented vendors such as Tandem Computers, Inc. and Stratus Computer, Inc.

"That's the market that Honeywell Bull says it wants to be in," Weathers said.

Weathers called the DPS 8000 a crucial part of the Honeywell Bull product line but said the company still must add to its application software library for GCOS 8.

No plans to cut off DPS 8

Although the DPS 8000 is a follow-on to the 5-year-old DPS 8, Honeywell Bull will not discontinue the DPS 8 until customer demand abates, according to James R. Bloom, the company's executive vice-president of marketing and planning operations.

He said the company has received 20 orders for DPS 8000 systems, which will be manufactured in the Phoenix facilities where Honeywell Bull makes the DPS 8. The systems will be made at facilities in France next year.

The Gartner Group's White, however, said the DPS 8000's introduction is causing the residual value of DPS 8 systems to plummet. "Had it been announced as an extension product rather than a follow-on, it probably wouldn't have had that impact," White said.

The DPS 8000 is the first Honeywell Bull system to use 1M-bit memory chips and was designed to support 4M-bit chips when they become available. Current models provide up to 256M bytes of memory, according to Honeywell Bull.

The DPS 8 uses transistor-to-transistor logic circuits, while the DPS 8000 uses proprietary gate array technology with 1,500 bipolar gates. Like the older system, the DPS 8000 is air cooled. The DPS 8000 is based on 10 boards, compared with 39 boards in the DPS 8.

The DPS 8000/81 supports 128 logical channels, and the DPS 8000/82 supports 256.

The DPS 8000/81 costs $675,000 with 16M bytes of memory, and the DPS 8000/82 costs $1.3 million with 32M bytes of memory.

Enhanced DPS 6 Plus

Honeywell Bull also added to the DPS 6 Plus family with the introduction of the DPS 6 Plus Model 400, which is a compact system that can be upgraded to the vendor's existing Models 410 and 420.

The Model 400 was designed to compete with the Digital Equipment Corp. VAX 8250 and to support 38 to 50 users. Prices start at $33,000 for a 2M-byte system.

Honeywell Bull announced that all three DPS 6 Plus systems now have a three-CPU option, in addition to the existing one-, two- and four-CPU capabilities.

Meanwhile, company officials said the DPS 6 Plus line will be extended upward next year with the introduction of a 600 series — and downward later this year with the 200 series, which will be designed to compete with DEC's Microvax II. Honeywell Bull confirmed the 200 series was recently made available on a limited basis in Australia to meet the requirements of one customer.

Honeywell DPS 8000/8 systems

Specifications and genealogy

	DPS 8000/81	DPS 8000/82
Memory (bytes)	16M to 128M	32M to 256M
I/O throughput	17M byte/sec.	35M byte/sec.
Transactions[1]	60/sec.	110/sec.
Base price (memory)	$675,000 (16M bytes)	$1.3M (32M bytes)

[1] Honeywell Bull claims

Product family	*Introduced*	*Price range*	*Recent announcements*
DPS 6/ 6 Plus	1980	$33,000 to $410,000	DPS 6 Plus Model 400 announced in June
DPS 7/7000	1981	$127,000 to $1.2M	DPS 7000 introduced in April
DPS 8/8000	1982	$153,000 to $1.3M	DPS 8000 introduced in June
DPS 88	1982	$1.85M to $3.7M	Enhanced in October 1986
DPS 90	1985	$3.55M to $7.6M	10% price cut in February

CW CHART

Interface goes two ways

Honeywell Bull, Inc. last week claimed to provide mainframe users with seamless access to both relational and nonrelational data bases through a single SQL interface with an integrated relational data base management system.

In addition to announcing the Interel relational DBMS for its three GCOS 8-based mainframe families, Honeywell Bull introduced Infoedge, which is a set of productivity tools for nontechnical users, and the Development Center Nucleus, productivity tools for data processing professionals.

Honeywell Bull claimed to be the only mainframe vendor to offer the SQL-based relational and nonrelational capability, although similar products have been announced for minicomputers, including Hewlett-Packard Co.'s Spectrum series.

"The Interel SQL interface and new sets of software products are significant steps toward the ultimate goal of integrating computing resources and providing easy, consistent access to current information from any point within the network," said James R. Bloom, Honeywell Bull's executive vice-president of marketing and planning operations.

However, analyst Chuck White, of Stamford, Conn.-based market research firm the Gartner Group, Inc., said Interel may not be a long-term solution for Honeywell Bull. "Honeywell Bull's long-term strategy is to provide the Oracle [Corp.] data base on all of its platforms. Interel is not based on Oracle, so it should be viewed as a tactical rather than strategic move," White said.

Honeywell Bull's predecessor company, Honeywell Information Systems, announced Oracle with the DPS 6 Plus minicomputer family last year. Interel reportedly will be available in December with Software Release 3000 of the GCOS 8 operating system, which was announced in May, for use with Honeywell Bull's DPS 8, 88, 90 and 8000 mainframes.

Interel requires "a few simple commands" to automatically create table definition and data base table space, establish the necessary controlling information and deposit the information into a central dictionary known as the Information Resource Dictionary System (IRDS), according to Honeywell Bull. The company said a user specifies the desired data and that Interel chooses the best way to gain access.

IRDS was designed to interface with full relational files, conventional sequential and indexed files and Honeywell Bull's Conference of Data System Language DBMS, known as I-D-S II, which the company has said it still supports but will not enhance, according to observers.

License origination fees for Interel range from $8,000 to $14,000, depending on system size. Monthly license fees range from $950 to $2,100. The company said the Infoedge productivity tools, designed for use by technical and nontechnical users, are supported under Interel. The basic Infoedge product set includes an electronic spreadsheet and forms generator and a menu system that integrates Infoedge options, including a personal computer interface, into the system.

The Development Center Nucleus includes tools designed to simplify the design, generation, testing and maintenance of applications. It costs $9,450 and has a monthly license fee of $3,150.

JAMES CONNOLLY

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PA	Harrisburg	Aug 4, Sep 15
	King of Prussia	Jul 16, Sep 17
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† *Digital News*, December 1, 1986.
‡ Gartner Group currently available research.
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TRBA

IBM further reduces partial ownership of Intel

BY CLINTON WILDER
CW STAFF

ARMONK, N.Y. — IBM announced last week that it has further reduced its partial ownership in Intel Corp. by selling 8.9 million shares of Intel stock back to the Santa Clara, Calif., semiconductor maker.

The sale, which netted IBM $361.5 million, reduced IBM's equity stake in Intel to 11.5%. Upon completion of a previously announced exchange of 7.8 million shares of Intel stock for IBM Eurobonds [CW, Feb. 3, 1986], however, IBM's stake would be reduced to 5.9 million shares, or less than 5% of Intel.

IBM, in its expansive spending days of 1983, originally purchased 12% of the chip maker, later increasing its stake to as high as 20%. The moves prompted speculation that IBM eventually planned to acquire Intel. The speculation was further fueled when IBM moved from a partial equity position in Rolm Corp. to a complete buyout of that Santa Clara-based private branch exchange vendor.

But because of its own financial slowdown and the U.S. semiconductor industry's overcapacity, according to analysts, IBM made the surprise announcement early last year that it may cut back its Intel stake via the bond conversion. Last week's announcement represented a further move in that direction, and IBM reiterated its intention to complete the 7.8 million-share conversion.

"We believe IBM's investment in Intel accomplished our objective of helping to strengthen a major participant in the semiconductor industry," IBM Chairman John Akers said.

Intel President and Chief Executive Officer Andrew Grove noted that the IBM investment helped Intel continue satisfactory research and development and capital spending levels during the prolonged semiconductor industry slump.

Spreadsheet compiler developed

BY ED SCANNELL
CW STAFF

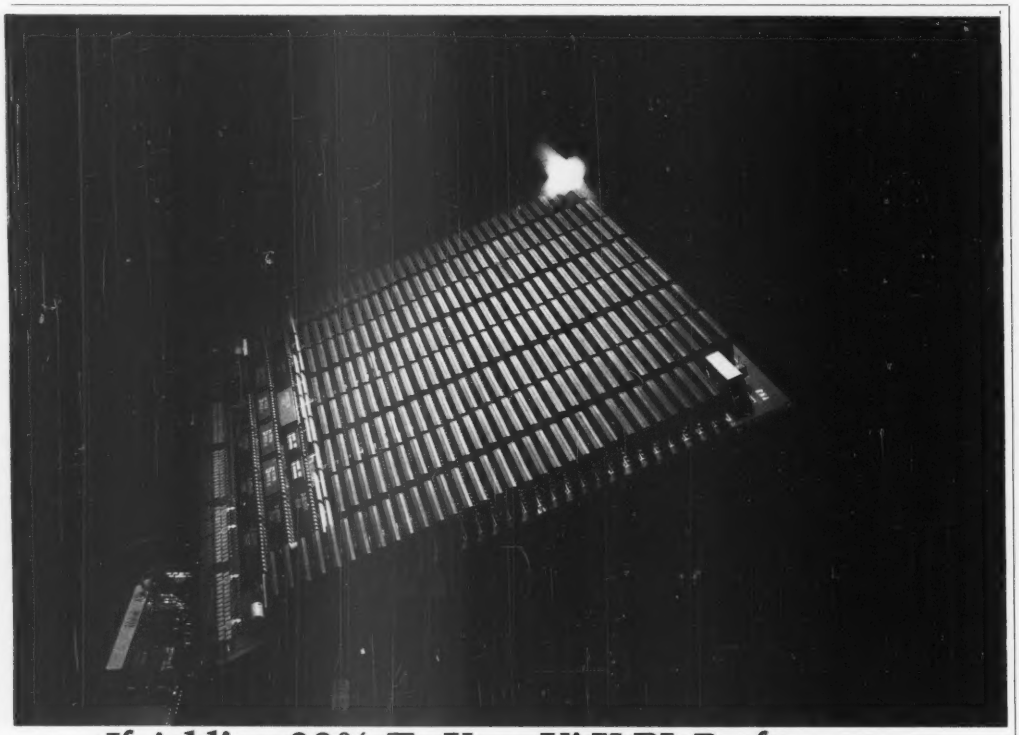
MANCHESTER, N.H. — Softlogic Solutions, Inc. introduced last week what it claims is the microcomputer industry's first spreadsheet compiler.

Christened At Liberty, the program, which allows users to develop and distribute spreadsheet applications, reportedly is the first to separate the tasks of developing and using a spreadsheet. It is said to allow corporate and third-party developers to create applications or templates using spreadsheets such as Lotus Development Corp.'s 1-2-3 and Microsoft Corp.'s Multiplan and to distribute executable runtime files.

"I think it allows a broader range of people to make more effective use of spreadsheets in their work," said Ed Tolson, Softlogic's president. "It gives organizations and developers a way to reduce costs and to create and sell new types of products." Tolson said he believes At Liberty will appeal to corporate data processing and MIS managers, many of whom have centered their companies' spreadsheet strategies around 1-2-3.

Users can run a spreadsheet compiled by At Liberty without the presence of the original spreadsheet to enter data, Tolson said. Users can then calculate results and transport that data back to the developer. All spreadsheet formulas are hidden from users, and the original file is protected from users.

At Liberty reportedly will be sold both through Softlogic's direct-response advertising and its network of dealers for $99.95. The program is expected to be available in July.



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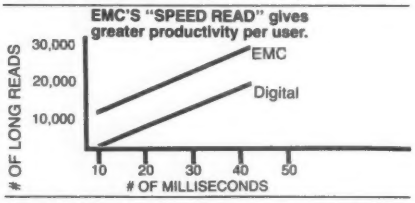

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* Washington University Center for The Study of Data Processing as reported in the 11/15/86 DATAMATION, pp 79-86.
** U.S. Pat. 4, 648, 044.
*** U.S. Pat. 4, 658, 370.

BBN enhances RS/1 data analysis package

Improved graphics, new data types provide common base for other recent intros

BY CHARLES BABCOCK
CW STAFF

CAMBRIDGE, Mass. — A data analysis package established in scientific and engineering circles, RS/1 from BBN Software Products Corp., has been enhanced to provide better graphics and new data types.

Release 3.0 of RS/1 has also been redesigned to provide a common foundation for two other products introduced six months ago: RS/Discover, a package for building experimental designs, and RS/Explore, a statistical advisory package, according to Duncan I. Mackay, product manager.

RS/1 includes its own English-like language, RPL, which allows users to add rows and columns to a table with a single command, answering prompts for the needed information.

Graph-making ability

The product also includes a command to make graphs, with the user filling in necessary information and the system creating a three-dimensional image.

A curve-averaging facility has been added to smooth the presentation image of an irregular curve, BBN spokesmen said.

Vectors and matrices have been added to RS/1 as data types, speeding execution of certain computations.

Overall efficiency improvements have been made to speed system performance in displaying graphics, calling procedures, accessing tables and doing sorts. Efficiency has been improved by as much as 75% on the latter, BBN spokesmen said.

The data handling characteristics have helped push RS/1 into the manufacturing world, especially after BBN added a Quality Control Analysis module two years ago.

RS/1 is now used in an estimated 300 manufacturing sites, according to Thomas Kush, BBN vice-president.

A total of 5,000 RS/1 licenses have been sold — 4,000 to personal computer systems and 1,000 to Digital Equipment Corp. VAX or IBM mainframe systems, Kush said.

RS/1 is priced at $3,900 on the Microvax, $35,000 on the VAX 780/8350 and $79,000 on the VAX 8800. Its pricing on the mainframe, dependent on the number of users, ranges from $25,000 to $150,000.

BBN is a subsidiary of Bolt, Beranek and Newman, Inc.

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Cullinet AE tool reworked

BY CHARLES BABCOCK
CW STAFF

WESTWOOD, Mass. — Cullinet Software, Inc. said last week it is offering its expert system development environment, Application Expert, for transaction processing applications in IBM's main production environment.

The $90,000 product is geared toward providing embedded expert systems for applications running under IBM's MVS/CICS. Cullinet rewrote Application Expert in IBM's CICS Cobol after acquiring Distribution Management Systems, Inc., the originator of the product, in February.

John Landry, former chairman of Distribution Management Systems and now a Cullinet vice-president, said Application Expert was developed on a Digital Equipment Corp. VAX in DEC Cobol. The rewrite added several months to the period required to bring Application Expert to market as a Cullinet product. With the rewrite, it can now run on either DEC VAXs or IBM mainframes, he said.

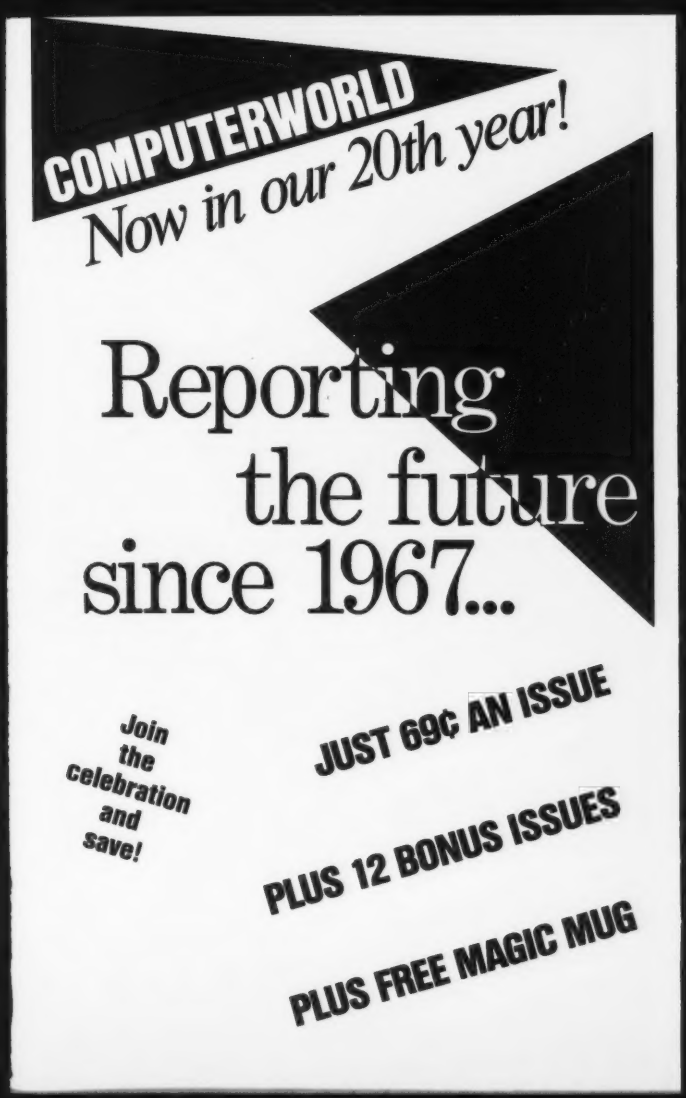
'Customers want system'

Only three copies of the product have been sold as a $35,000 to $60,000 VAX product, but Landry said Cullinet anticipates demand will be brisk. The company's mainframe customers have been calling, "asking when the damn system will be ready," he said. Availability is scheduled for July 1.

Application Expert is an expert system shell that is said to allow a user to build a knowledge base, process the rules in it via an inference engine and go through question-and-answer sequences with a dialogue facility. In addition, a knowledge-acquisition module provides an editor that helps the user add to or modify the knowledge base, according to the vendor.

In its initial version, the development shell will work with VSAM files under CICS. Before the end of the year, a version to work with the teleprocessing monitor of Cullinet's data base management system, IDMS DB/DC, will be available, and the expert system shell will be integrated with Cullinet's fourth-generation language, ADS/Online, Landry said.

A personal computer version is also under development and will be available before the end of the year, Landry said.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338724-8

HP applications duel SNADS functionality

BY ELISABETH HORWITT
CW STAFF

PALO ALTO, Calif. — Squaring off with IBM, Hewlett-Packard Co. last week unveiled minicomputer-based distributed application development tools that it claimed provide more functionality than Systems Network Architecture Distributed Services (SNADS).

The company also revealed intentions to develop network management applications that could compete with IBM's Netview family.

HP's Netdelivery/V provides guaranteed transparent delivery of files and messages between applications residing on one or more HP 3000 minicomputers, according to Willem P. Roelandts, general manager for HP's Information Networks Group. "If the link is down, the software keeps trying until it gets through," Roelandts said. If a file gets through but the acknowledgement from the receiving system is lost, the receiving system will automatically discard the duplicate file, he added.

Supports data delivery

While SNADS is a store-and-forward document-delivery system that is most commonly used for electronic mail applications, Netdelivery also supports delivery of data and commands between distributed applications, Roelandts said. "So you can set up a session on another computer, have it find records, do a calculation and send you the results when it is finished, eliminating the need either to remain online while the job is being done or to download an entire file and do the calculations locally," he explained.

In addition, while SNADS offers only three intrinsic commands — Send, Receive and Send Status — Netdelivery offers 37 commands, including one that allows an application to initiate a host session on a separate system and another that automatically changes the priority of a transmission waiting in a queue to be sent.

IBM's peer-to-peer architecture, LU6.2, is designed to handle the type of application-to-application exchange supported by Netdelivery, but LU6.2 leaves it up to the user to write into each application the necessary commands to initiate each segment of the job and to ensure delivery across the network, Roelandts said.

IBM is reportedly working on such capabilities for its Advanced Peer-to-Peer Networking architecture, which currently exists in prototype form as an IBM System/36 networking system.

The Netdelivery/V software currently sits on top of HP's Network Services and Open Systems Interconnect-compatible Advancenet networking system. In a position paper released last week, HP said that it is considering versions of the product for the CCITT X.400 electronic mail standard, SNADS and IBM's SNA/LU6.2.

Available immediately, the product is priced at $3,800 for the HP Micro 3000 system and $9,850 for HP 3000 Series 39 through 70 systems.

HP also announced that it has extended the functions of its systemwide data dictionary, which was introduced approximately a year ago, making it a "global data dictionary" that keeps track of data across multiple systems. The upgraded product reportedly allows users to merge various data dictionaries into one centralized dictionary and then to distribute subsets or copies of those files across multiple computer nodes.

The resulting distributed system keeps track of networked resources such as data bases, applications, user addresses and peripherals so that applications can address resources transparently across a network.

The next planned release, a "networked global dictionary," will automatically distribute updates across a network so that all nodes receive versions that reflect recent additions and changes, Roelandts said.

A second dictionary released last week is said to allow MIS managers to compile all or part of a dictionary in read-only mode, which reduces access time for applications that only need to look up an entry and prevents users from making unauthorized changes to the dictionary.

The global dictionary feature is available immediately as part of the HP System Dictionary, which is included in operating software for all HP 3000 computers.

Intent to foster third parties

Another release from HP last week was a position paper stating the company's intention to "provide individual network management applications, on the host or personal computer, that are common across different third-party vendors and provide capabilities like fault and performance monitoring, configuration control, accounting, security and a common data base to collect data," Roelandts said.

Some of the applications provided by HP will be from third parties; some "will use our guts and their shells; some will be just HP," Roelandts said. The user interface is likely to be based on an existing product or standard, such as Xwindows or Microsoft Corp.'s Windows, he added.

The company said it plans to further delineate its network management product strategy by year's end.

Optical drive boasts most space for PC

CHICAGO — Targeting users who need to economically store large files on nonvolatile media, Corel Systems Corp. announced last week what it claimed is the highest capacity optical disk drive available for the IBM Personal Computer.

The firm's write-once-read-many Optical Disk Drive is said to have a storage capacity of 800M bytes. Corel said the disk drive supports all Microsoft Corp. MS-DOS applications and does not require the use of any special commands.

Chief Executive Officer Michael Cowpland said the drive was designed for a variety of large storage applications. One of the drive's key features is its audit-trail capability, which enables the user to "quickly and easily recover any file that has been updated or deleted, since all files ever written to the disk remain there," Cowpland said.

Corel said it provides recovery software for retrieving old versions of files and for retrieving file updates.

An adapter and unit that fit into a full-height disk drive enclosure lists for $3,995. An external unit lists for $4,395. Cartridges for the drives are $225 each. The drives are available now, Corel said

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VM Software betting on 9370

BY ROSEMARY HAMILTON
CW STAFF

BOSTON — Banking on the predicted success of the IBM 9370, VM Software, Inc. has revamped its entire product line to suit that departmental system and will begin shipping its new VM utility software next month, company executives said last week.

At the VM Software Annual User Conference held here last week, executives also said VM Center II, an integrated collection of utilities, will be generally available in November. A preliminary version of VM Center II, the enhanced version of VM Center, has been shipping to customers at VM Center prices, which range from $22,000 to $66,000, a company spokesman said. Pricing for the official version of VM Center II, currently at beta-test sites, has not yet been established, he added.

The vendor also announced that two new utilities, VMspool and a rewritten version of VMbackup, will be released by year's end.

Upgrades free

Current customers with maintenance contracts on either individual utility packages or the VM Center products can upgrade to the revamped products free of charge, according to Ronald Kral, vice-president of strategic marketing. Each utility will have a different amount of new code representing these modifications, he added.

The utilities have been modified for easier installation and maintenance, which will be a key requirement for 9370 software, the firm said. As a departmental system, the 9370 is being targeted at system administrators, whose technical knowledge is typically less than that of traditional data processing managers.

VM Software, which with $18 million in revenue last year is the largest independent software supplier that markets VM tools exclusively, said that while the new products are targeted at 9370 users, they are not exclusively for that customer base.

According to Kral, the vendor's traditional MIS customers have requested simplified versions of the VM Software products. In addition, many of these customers are likely to be ultimately responsible for the departmental operations — and the smoother those systems run, the easier their jobs will be.

"With the proliferation of VM, any time savings we can give to any users will be appreciated," he said.

Keeping it simple

According to Kral, the modified utilities result from a project to standardize the product line. The intent was to establish a common method of installing and maintaining the individual utilities. Currently, the VM Software utilities are handled in a variety of ways. Although the utilities are based on the same fundamental principles, they were designed at different times by different development groups, Kral said. The result has been subtle differences between utilities that can make overall management of utilities difficult.

For example, each utility has a configuration file that describes the system's configuration. Currently, it can reside at a different place on the system and go by whatever name the user assigns. With the modified versions, the configuration file for each utility will use a standard name and reside on a standard place on the disk with a specific address space, Kral said.

"This makes installation easier, because when you install one, the next utility will be easier because you know where things go," said Janet Gobeille, a VM Software product manager.

Because the VM Center products are based on these utilities, they, too, will correspond to the new standard the vendor has established, Kral said.

NBS cooking up publishing lab

Goals to ease user confusion, form and test electronic paging standards

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The National Bureau of Standards announced last week that it will open an Electronic Publishing Laboratory at its Gaithersburg, Md., facility next month to provide technical guidance to users and to help develop standards.

"We'll provide advice to people who are experiencing the same kind of confusion and frustration we've experienced internally," said Lynne Rosenthal, a computer scientist specializing in office systems engineering at the bureau's Institute for Computer Sciences and Technology.

In addition to its role as a showcase of electronic publishing technology, the lab will be a focal point for government and industry participation in producing page composition and description standards and a test site for verifying the feasibility of the standards, Rosenthal said.

Wide scope

In an interview at the 1987 Federation of Conferences on Information Systems (Focis) trade show, held here, Rosenthal said the lab consists of a broad range of workstations, computers and peripherals that are used for text and graphics processing and printing and are connected by an Ethernet network.

So far, the lab is dominated by hardware and software using Adobe Systems, Inc.'s Postscript page description language, but other product lines will be added in the future, she said.

Adobe Systems, based in Palo Alto, Calif., was the only vendor that responded to the bureau's request for assistance, Rosenthal explained. Adobe Systems will donate its Adobe Type Library and Illustrator graphics package to the lab. Computers, printers and typesetters will be donated by Apollo Computer, Inc., IBM, Apple Computer, Inc., Digital Equipment Corp. and other vendors.

Feds prime target

Users will be able to tour the lab and obtain guidance about the features and limitations of the systems. The primary goal is to provide technical guidance to users in federal agencies, but the lab will be open on a limited basis to private-sector users, Rosenthal said.

She said applications or projects will be developed in order to evaluate the electronic publishing systems, ranging from the execution of typical office documents and newsletters to complex publishing tasks involving the U.S. Government Printing Office.

The first Focis trade show consisted of five educational conferences and one vendor exposition.

Lanstar PC to shuck PBX

BY DONNA RAIMONDI
CW STAFF

In a move to strengthen its position in the local-area network (LAN) market, private branch exchange vendor Northern Telecom, Inc. will announce this week a series of moves to redefine its Meridian Lanstar PC as a stand-alone product.

The Lanstar PC, released in 1985, has traditionally been integrated with Northern Telecom's SL/1 voice and data PBX, said Henry Theloosen, general manager of the Meridian Packet Transport Equipment Group. As a stand-alone unit, the LAN is targeted at MIS or telecommunications managers who want to implement a companywide LAN solution, Theloosen said. The Lanstar PC uses standard, unshielded twisted-pair wiring such as existing telephone wires, he added.

As part of the strategic move, Northern Telecom signed an agreement with Banyan Systems, Inc. that will allow Northern Telecom to resell Banyan's virtual networking software, Vines and Vines/286, and Banyan's network servers and desktop servers with the Lanstar PC. Banyan will also reportedly develop software modules and drivers for the Lanstar PC network.

"Northern Telecom has the very real perception that work groups of personal computers are a big, emerging market opportunity," said Bart Stuck, vice-president of Probe Research, Inc. in Morristown, N.J.

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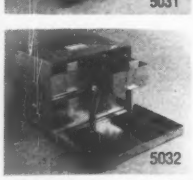
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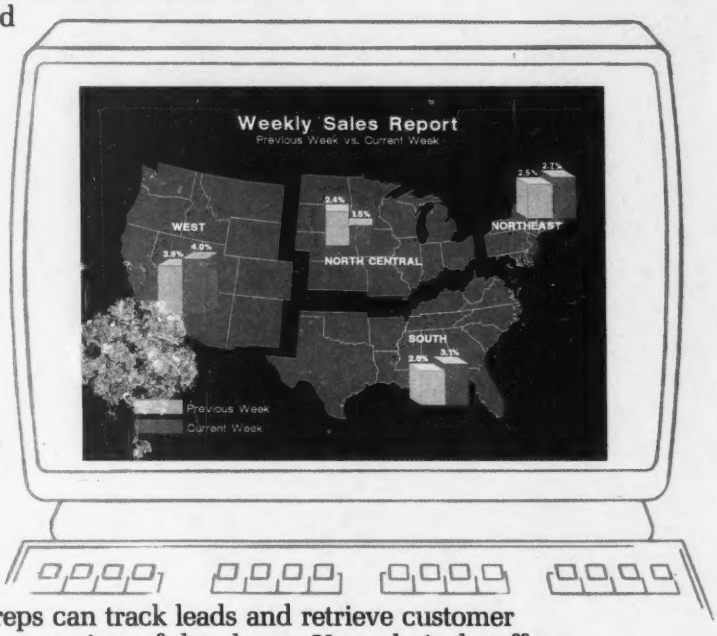

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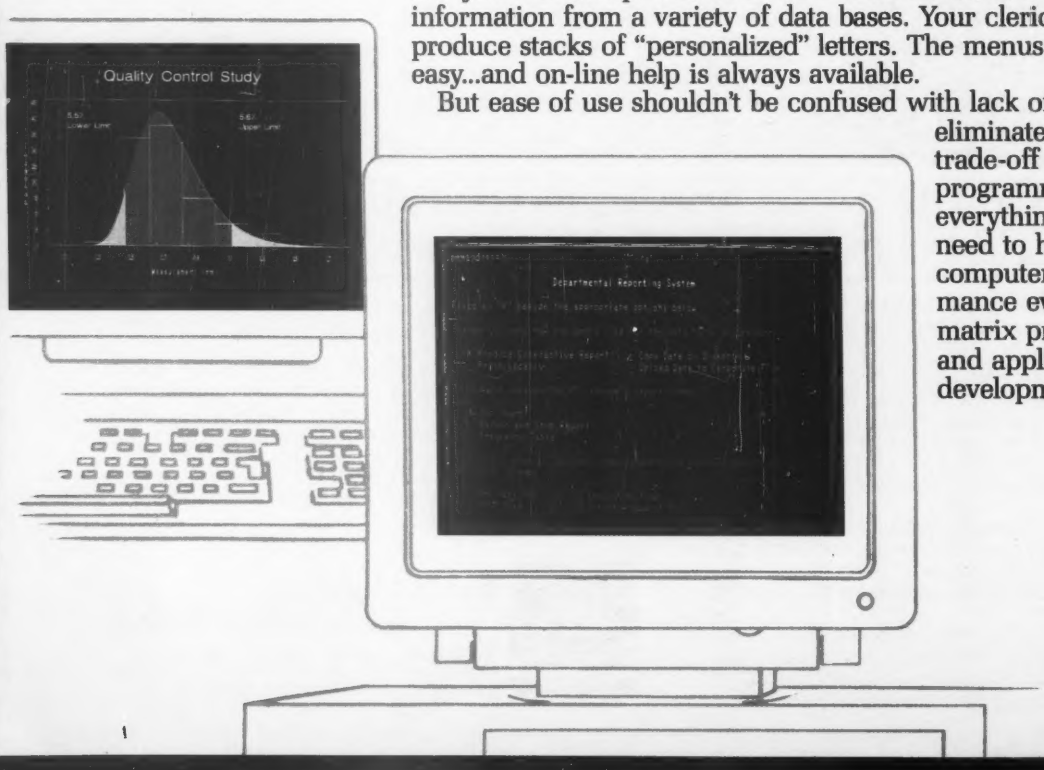

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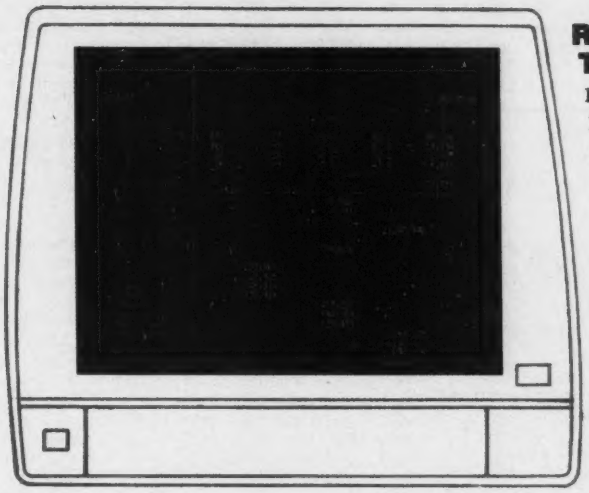

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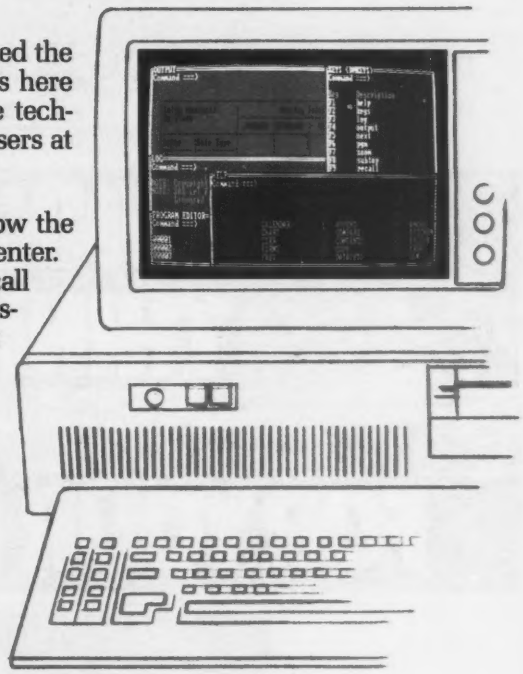

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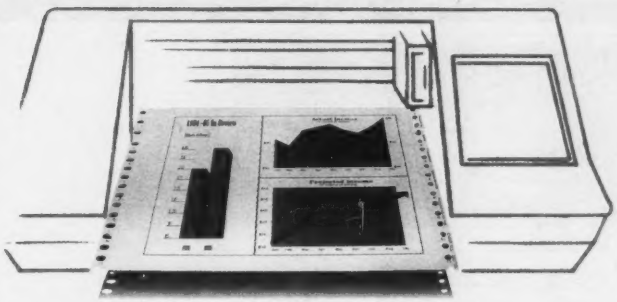

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Tenneco chooses Centrex, ISDN for data linkup

BY ELISABETH HORWITT
CW STAFF

HOUSTON — One of the first businesses to purchase Integrated Services Digital Network (ISDN) equipment and services on a nontrial basis, Tenneco Corp. is making plans to link voice and data equipment at its headquarters offices here over ISDN-compatible Centrex services by early 1988.

The conglomerate chose ISDN not because it wants to ensure its place on technology's leading, bleeding edge but because an ISDN-based Centrex system best meets the communications needs of Tenneco's headquarters buildings, according to John Saccente, director of corporate telecommunications.

The company wanted a cost-effective network that would support both voice and data communications throughout a group of buildings that house headquarters for four of its companies plus corporate headquarters, Saccente explains. Tenneco wants to upgrade the current Centrex service from Southwestern Bell Corp., which supports voice communications for the campus area, to the regional holding company's "rate-stabilized, enhanced, ISDN-compatible Centrex service," in Saccente's words. The new service will support both data and voice communications over the ISDN Basic Rate Interface.

"We chose ISDN because of the cost savings it offers and the fact that the technology would be long-lasting," Saccente says. "We would have chosen AT&T's Information System Network if it had worked better, but we're glad it turned out to be ISDN."

This spring, Tenneco put out a request for information to terminal vendors and currently is considering Hayes Microcomputer Products, Inc. ISDN-compatible personal computer interfaces and Fujitsu America, Inc. and AT&T terminals. The company also has received responses from NEC Corp., Northern Telecom, Inc. and ICL PLC, a computer company in England that sells an ISDN-compatible workstation. "AT&T's version of the interface is not yet fully compatible with the ultimate CCITT standard, but AT&T plans to migrate to the rest of the specifications," Saccente says.

Tenneco specified in its request for information that terminals must be compatible with the AT&T 5AESS switch that Southwestern Bell uses to support ISDN in its central office. "Since different manufacturers began at different times, some have features that are not part of the current ISDN specifications We realize we'll have some migration down the line," Saccente says. "The good news is that we have choices in terms of equipment." Tenneco says it hopes to choose terminals within the next few months.

Implementation is scheduled for May 1988. At upgrade time, voice and data terminals will be equipped with Basic Rate Interfaces that each support two 64K bit/sec. digital channels for voice, data or video and a separate 16K bit/sec. D channel for signaling and packet-switched transmissions.

"Grinding out the Houston Southwestern Bell contract has been a unique experience," Saccente says. "ISDN is a different way of doing business." Instead of buying an existing service, Saccente's people have had to meet repeatedly with Southwestern Bell in order to define exactly what ISDN services the regional Bell holding company will file as a special tariff with the Federal Communications Commission.

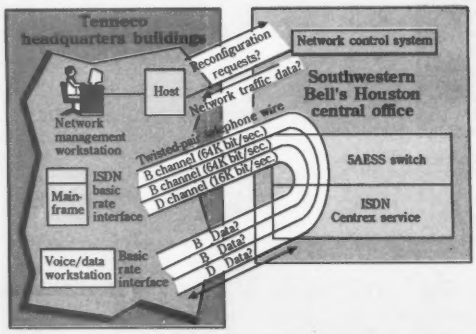
Learning process

Southwestern Bell also has learned from its negotiations with Tenneco, according to Robert Campbell, marketing division manager. "There have been so many more capabilities and applications to take into consideration; we have had to sit down with them and do a study on how to use bandwidth, how to access files, how much switched data will go on the B channel. It has been an educational experience," he says.

One application area that Tenneco and Southwestern Bell are still working out is how — and where — to implement net-

Tenneco's ISDN Centrex lines: What goes where?

The company is still discussing details of network management services and debating the merits of B channel vs. D channel for data transfer



CW GRAPHICS: SUSAN ALDAM

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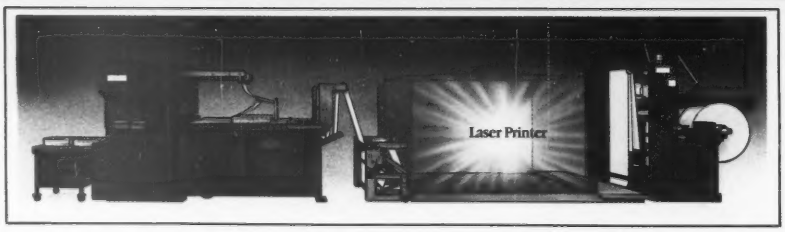

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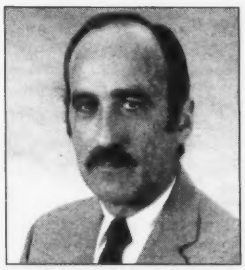
work management. "We've had considerable discussion about what can be on-line, [what can be] off-line," Saccente says. The current plan calls for an on-line management system that consists of a terminal at Tenneco that sends reconfigurations and other network commands to an on-premise host processor, which then sends the requests in batch mode up to Southwestern Bell's central office.

"We concentrated more on the performance aspect — what kind of action we need done in an hour, what can be done in a day — rather than mechanics," Saccente explains. At this point, Tenneco is still unsure what kind of management services it wants beyond reconfiguration capabilities, he adds. For example, the company may want to access error and usage statistics that have



Tenneco's Saccente

been collected on a Southwestern Bell system. Another question still to be answered is which subbands within the Basic Rate Interface — the B channel or the D channel — will be used for different data communications needs. The B channel supports a higher transmission rate but provides less flexibility in terms of link configuration than the packet-switching D channel connection, Saccente explains.

For the moment, Saccente's group, which coordinates telecommunications technology implementation throughout the conglomerate, does not envision ISDN as a standardized way for all of the companies to communicate within Tenneco. Several divisions have their own networking schemes. Tenneco Oil Co. is already using an IBM Systems Network Architecture (SNA) network to link headquarters with remote divisions. This link can be accomplished by having a processor act as a gateway, such as a computer on both SNA and ISDN networks.

Regional Bell holding company Bell Atlantic Corp. recently proposed ISDN services to Tenneco's Newport News, Va., shipbuilding concern, but the latter company had already implemented AT&T's System 85 private branch exchange (PBX), Saccente reports. "A premise-based solution was more compatible with that company's communications needs, and besides, ISDN was not available when it [the Tenneco shipbuilding firm] was ready to implement a network," he added. However, the company plans to migrate to ISDN as AT&T migrates its PBXs, according to Sonny Marini, telecommunications supervisor for the Newport News company. The move to ISDN will be practical; AT&T is introducing a number of new ISDN-compatible features for its PBX.

"It will be great when the whole country has ISDN and I can call Sonny up and light up his message-waiting light via my D channel," Saccente says. "But that's not why we did this." Still, ISDN is "a breath of fresh air in this confused proprietary mishmash we've been subjected to all our lives."

Southwestern Bell currently offers ISDN Centrex as a special tariff service, in which rates, features and contracts are negotiated individually with each customer. This holding company does not anticipate offering the service as a general tariff in the immediate future, according to Campbell. A major reason is that demand for the service is expected to build slowly. "We cannot ask our rate-payers to subsidize the service," Campbell says.

The cost of future ISDN Centrex contracts will vary with the demand in a given region. Local carrier Southwestern Bell Telephone Co. will be able to offer both Shell and Tenneco some price breaks, because both Houston companies will share the same 5AESS central office switch, according to Campbell.

Jobs says Unix must mature or die

But system gets positive reviews from those polled at Usenix

BY ELISABETH HORWITT
CW STAFF

PHOENIX — With the Intel Corp. 80386 version of AT&T's Unix System V, Release 3 on the verge of shipping, Steve Jobs, former chairman of Apple Computer, Inc., last week addressed a large group of Unix programmers on how the operating system must mature in order to successfully challenge the likes of IBM's OS/2 and Apple's Macintosh.

Jobs, president of Next, Inc. — a company that is expected to announce a low-cost Unix-based system this fall — spoke during a keynote address at the Usenix summer conference, held here. Usenix is a national organization of Unix users.

Unix will either be a mainstream operating system by 1990, Jobs said, "or [it will] die." He added that "a whole lot of money is riding on Unix not being successful."

Up against Unix are powerful vendors such as IBM, Digital Equipment Corp. and Microsoft Corp., which "is looking forward to OS/2 royalties and sees Unix as a rearguard product," Jobs said. He also named his former company, Apple, as another Unix detractor. "When you have the best user interface, you don't want to see thousands of bright people trying to copy it on top of Unix — especially when Unix is multitasking."

Jobs said in order to succeed as a user-oriented operating system, Unix must undergo the following breakthroughs:

- System administration should be simplified so that "you can open the box and plug it right in."
- The user interface must be improved, since the current version "is impossible for mere mortals to use."
- Different versions of Unix must give way to one standardized operating system that includes a consistent application tool kit.
- Unix needs built-in graphics and windowing.
- The industry needs "a low-cost, breakthrough Unix computer."

Jobs's speech drew mixed reactions from vendors and users at the conference.

"I think he is talking about the mass market — users of Macintosh and so on — who don't buy systems to hack," said Brian Moran, a systems programmer at The Times Mirror Co. He said he might consider switching from Unix to OS/2 if the latter proved faster. "But the extended OS/2 is likely to have a lot of overhead," and programmers may not want some of its more advanced features, he said.

On the exhibit floor, several vendors were demonstrating products based on the 386-based Unix System V, Release 3 product that Interactive Systems developed in concert with AT&T and Intel.

Bell Technologies announced that it will start shipping its version of the Interactive Systems product, despite the fact that AT&T certification is still approximately two weeks off, according to Bell Technologies President Dimitri Rotow.

Single-quantity pricing for Bell Technologies' offering is $99 for two users. However, support costs $495 for two users, plus an hourly support charge. Installation is free. The product is said to incorporate both Interactive Systems' and Bell Technologies' device drivers.

Other vendors, including Micom/Interlan, Inc. and Intel, said they would wait for AT&T certification before beginning commercial shipments of their own products, which are based on the Interactive Systems offering. Micom/Interlan demonstrated its NP622, a hardware and software product that implements Transmission Control Protocol/Internet Protocol on a Unix System V, Release 3 80386 system.

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EDITORIAL

Failing grades

"Human history becomes more and more a race between education and catastrophe."
The Outline of History

The cornerstone of the success of the U.S. in providing its citizens with the greatest opportunities in the world has been its higher education system. The products of this system got us to the moon first, contributed to a defense structure that has kept hostile forces from our soil for 175 years and, up to this point, has positioned the country to dominate the information age societies, much as we dominated the manufacturing world a generation ago.

Yet, as the opening installment of our MIS education series shows (see page 1), there are serious problems developing within that system. *Computerworld's* comprehensive probe into the subject, aided by an exclusive survey of 700 MIS professionals, revealed that:

- The nation's best and brightest talents are being lured away from MIS career training and toward more lucrative careers in pure finance.
- Fully 40% of the managers surveyed rated the universities' ability to prepare computer science candidates for careers in MIS as fair to poor.
- Interest in MIS education, as given by enrollment figures, has fallen abruptly in many areas, leveling off at best.
- Universities continue to struggle to find faculty willing to work for a professor's salary, given the salary potential the private sector offers.

Clearly, one would expect some decline in students' interest in MIS careers in line with the recent (relative) slump in the computer business.

But a look at the awesome needs during the next decade for qualified information professionals — a need certain to create a strong "seller's job market" — makes the current situation in MIS education look very much like a crisis.

The root of the imminent labor shortage lies in the evolution of information systems management. The DP/MIS environment of the 1960s was a hardware, batch-oriented environment; in the 1970s and most of the 1980s, it was applications software, with equipment purchased and used for specific applications in an increasingly distributed environment. The next 10 years will witness the development of totally integrated, fully networked information systems. They will not be application-specific systems, per se, but flexible "enabling environments" designed to help managers initiate business plans even before opportunities are conceived. Building these systems will require the enormous brain power of professionals vested with strong technical *and* business skills, which is exactly what many MIS programs are failing to provide today.

The private and public sectors must aggressively confront this crisis, as any lapse in the ability of organizations to respond to the challenges of the information age would be disastrous. The higher education system has gotten us this far, always with great public and private support. The call for help is out again, and we do not have a lot of time to react.

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Wang started own ban, sold to S. Africa
Well, now, don't get flustered, An. You just tell them you were taking a nap when all this business took place.

LETTERS TO THE EDITOR

CASE addition

I am writing in response to "Four in the front: PC market leaders" [CW, April 20]. This article on computer-aided software engineering (CASE) software listed the top four companies in respect to the number of units they have sold. Perhaps due to a slight oversight, Yourdon, Inc.'s Analyst/Designer Toolkit was not even given an honorable mention. To date, Yourdon has sold approximately 1,475 units.

Yourdon's Analyst/Designer Toolkit runs on the IBM Personal Computer XT, AT and compatibles. This is a powerful CASE tool that automates structured development. We certainly would have appreciated recognition in your statistics.

Lisa M. DeSimone
Software Administrator
Yourdon, Inc.
New York

Making MRP sense

Recent *Computerworld* articles document the flap created by the Defense Contract Audit Agency (DCAA) in condemning material requirements planning (MRP) systems. The press is replete with omens of gloom and doom. It is time to stop mixing apples and oranges and get at the facts of this unfortunate situation.

The DCAA alleges that defense contractors are misapplying costs and defrauding the government. They say that MRP systems are causing the trouble. Therefore, defense contractors would do well to go back to manual ledgers in order to stay out of jail.

Some MRP systems people say that defense contractors should lobby for changes in the law so that commerical MRP software can be applied to the aerospace and defense industry.

Let's try to make some sense of this miasma.

MRP software has been around for years. There are more vendors doing a good job in this area than CW has chosen to

Continued on page 22

AT&T holding own

I am with AT&T Data Systems and proud to say so. Speaking strictly for myself, not the company, I think your editorial cartoon [CW, May 25] was inaccurate and unfair. After all, AT&T is investing a great deal of money and effort in trying to deliver to your readers more value than their traditional systems suppliers. Sure, our act is less than perfect today, but it is pretty good — better than you depicted and improving rapidly.

For an indication of the growing competitiveness of our products, take an unbiased look at the hardware and software products we announced March 24, such as the 3B2/600, Document Exchange and LU6.2 with PU2.1, or at our previously announced Model 6500 Multifunction Communications Controller. If you can get those levels of functionality, capacity and performance anywhere else at anywhere near our prices, we would like to know about it. And there is more coming — soon.

We are working on that sales force, too, to the tune of spending hundreds of thousands of man-hours on technical product training and upgrading our multitier presale and post-sale technical support systems.

Give us a break. It would take any major firm years, maybe decades, to make a significant impact on a relatively mature, global and brutally competitive industry like this. Based on my 28 years with several computer manufacturers, I would say AT&T is doing pretty well for its first 3½ years in the business.

William M. Stanger
Summit, N.J.

Much-pain, some-gain generation

Times will be hard for end users who create their own applications

JOHN KIRKLEY

By 1990, 80% of all applications will be generated by end users, the speaker told us. She backed her prediction with eloquent extrapolations from current trends, such as the increasing sophistication of fourth-generation languages, artificial intelligence and friendlier, graphics-oriented user interfaces that take into account the way people, not machines, like to work.

The speaker is highly respected in the industry, has a history of making accurate predictions and is probably right.

But now, several weeks later, I sense that she left something out. I do not doubt the predicted trend toward end-user applications generation will happen. But I do wonder just how painless it will be. If my experiences are anything like what a fledgling end user might go through, I would recommend root canal work as a fun alternative.

Although my experience takes place outside the corporate setting, there are parallels as to what end users may find.

The file garage

It all began simply enough.

My IBM Personal Computer AT was going away, and in its place I decided to purchase a Personal System/2 Model 30.

The hulking AT, with its 30M-byte hard disk, had monopolized a good part of my office for a year, on loan from a client. It accumulated a rich compost of files and programs, including all the little bits and pieces that one slips into a 30M-byte computer's seemingly infinite memory and then forgets to clean out.

I had fallen prey to those foes of good disk housekeeping, those voices that say, "... probably need this some day" and "I'll get around to cleaning out those old files next week." And so, like wind-blown paper, files that should have been used once and erased, began building up in seldom-visited subdirectories.

You know what happens. Pretty soon your disk begins to resemble your garage, containing bits of old lawn mowers, odd scraps of wood and wire, rusting and bent garden implements, three-quarters of a bike, a hose with random holes, lawn chairs in dire need of rewebbing and some parts for the 1964 VW you sold eight years ago.

In addition to all this junk, there was a powerful, flexible word processor on the AT I had come to rely on. A year ago, when the AT was fresh out of the box, one of my client's PC experts configured the machine for me, loading the various start-up files, including the word processor. He also wrote a number of helpful macros (for example, one keystroke took me from the word processor to the communications program) and did some other tweaking in the operating system and applications software to make my life easier.

BOB DAHM

But now it was time to switch to the Model 30. I felt a touch of panic — all those files, all those lovely macros, that nifty word processor. I didn't want to start from scratch; in fact, there were several jobs in progress on the AT. What I needed to do was make a smooth, painless transition from one machine to the other without missing a beat. I set aside a morning to do the job.

I called the computer store at which I decided to purchase the Model 30. "No problem," they told me. "Bring the AT to the store; we'll hook a cable between the two systems and simply pump the AT dry. Slap the AT back in its original box, ship it to the client, turn on the Model 30 and keep on trucking."

That was many days ago.

Since then I have come to know the guys at the computer store very well. I spend a lot of time there. One of their techies and I sit side by side, staring at screens, trying to figure out what went wrong this time.

As I write this column, the keyboard is functioning erratically, I have lost all my lovely macros, my communications program has taken a vow of silence, and my spelling checker has undergone some strange metamorphosis. When invoked, it threatens to eat anything that comes near it.

Most of the people at the store are very helpful. Their level of familiarity with the system varies, however, so I often have to wait until the person who knows how to solve the problem of the moment is free. Sometimes this person turns out to be an individual who has that remote, cryptic personality many have accused DP managers of developing. This individual wants to communicate only with his machines; people are a

Continued on page 22

Kirkley, a former editor of *Datamation* magazine, is an industry consultant currently acting as editorial adviser to Patricia Seybold's Office Systems Group. He is based in South Nyack, N.Y.

Innovation: Credit only where it's due

EFREM MALLACH

"IBM has impressive technology." True or false?

True, of course. IBM is one of a few corporations in the world with genuine basic research capabilities. They have made major advances in many fields. Their superconductor work is renowned. The firm is a leader in thin-film mass storage technology and high-density semiconductor memory circuits. It pioneered virtually every advance in half-inch magnetic tape recording. Optimizing compilers are indebted to IBM's early work.

IBM is not bashful about these accomplishments. The company recently ran full-page ads showing the chemical formula of a new superconductive material and explaining its significance. Ask IBM about its technology and you will get a long list of milestones plus an armful of literature. It has earned its bragging rights.

Smoke screens

Unfortunately, the hoopla obscures one vital fact about IBM technology, a fact users must understand for their own protection. Since the 1950s, IBM technology has been devoted to producing incremental improvements in the way things are already being done.

IBM's large mass-storage devices feature higher capacity, better performance and lower cost (not necessarily lower price) per megabyte than anybody else's. Every new product is followed by two years of competitive catch-up. But are larger, faster, less expensive disk drives a conceptual change in the way we use information? It's the same for tapes, semiconductor memories, optimizing compilers, microprogramming....

Now let's look at some things that have changed, or may change, systems use.

Word processing? Wang Laboratories, Inc. pushed it first. Several years later, IBM came up with the Displaywriter. Integrated office systems? From several minicomputer vendors. Networking? IBM's Systems Network Architecture was a weak reaction to what had been going on in Europe for years.

Unix? IBM is being dragged into it, kicking and screaming.

Virtual memory? A British development that General Electric Co. and MIT proved practical before IBM "invented" it. Data base management? From GE, too.

Multiprocessor mainframes? Almost every other vendor had one before 3080s came along.

Once in a while, of course, IBM does hit on something. It did pioneering work that led to relational data base management systems. But the work was carried out as pure theory and IBM didn't realize what it had. When it came to real products, only a DBMS market share hemorrhage got DB2 past the "toy" stage. IBM is still years behind Oracle Corp. and a host of others in this department.

> IBM technology has been devoted to producing incremental improvements in the way things are already being done.

Look at personal computers. IBM revolutionized the way data is processed on corporate desks. They took an unstructured world of 16-bit micros desperate for standards and gave it a flag to rally around. The PC was not a triumph of IBM technology, however. The PC technology was from Intel Corp., Microsoft Corp. and a host of other suppliers. IBM's success was a triumph of planning, of marketing and of one man's vision, helped by being in the right place with the right ingredients at the right time. But IBM technology? Not in the PC.

The Personal System/2 is different. Instead of being 15% "native IBM," the fraction is closer to 80%. But the PS/2 technology is devoted to doing the same things the PC does and only slightly better. Graphics adapters are smaller, better and a tad harder to clone. There are fewer chips, hence higher reliability. The bus is faster.

But innovations in the way things work? Wait for the new operating system from Microsoft. If you want desktop action, check Apple Computer, Inc.'s latest quarterly results. The Macintosh is genuinely different. It's doing to the PC market what Digital Equipment Corp. has done to the mid-range. Much of what's new in PS/2 is there to make it more "Mac-like."

Continued on page 22

Mallach teaches at Boston College School of Management and is a consultant to top user and vendor executives. Much of his consulting work involves systems selection and competitive analysis.

Generation

CONTINUED FROM PAGE 21

passing annoyance. True, he knows his stuff. But imagine him running an information center or being the key contact at an end-user help desk.

Minitrauma

So, this simple conversion, my minitrauma, causes me to wonder about the experiences end users will likely encounter as they become more enmeshed in doing their own computing and developing their own applications.

The transition would probably be easy if each new user came to the game unsullied by past experience, free of any baggage, a tabula rasa; if users came without old files, without work in progress, without little programs, routines, bad habits, odd quirks and foibles; if they came without that garage full of stuff that has been accumulating for years. The problem is they don't. And the MIS department members assigned to support these end users will be sorely taxed.

Perhaps now is the time for MIS to see that some nonstandard courses are added to the continuing education requirements for their end-user support staff — courses in interpersonal relationships; the art of communicating ideas, facts and concepts while being sensitive to the other person's needs; how to listen.

It could make the transitional years to 1990 a lot easier for everyone.

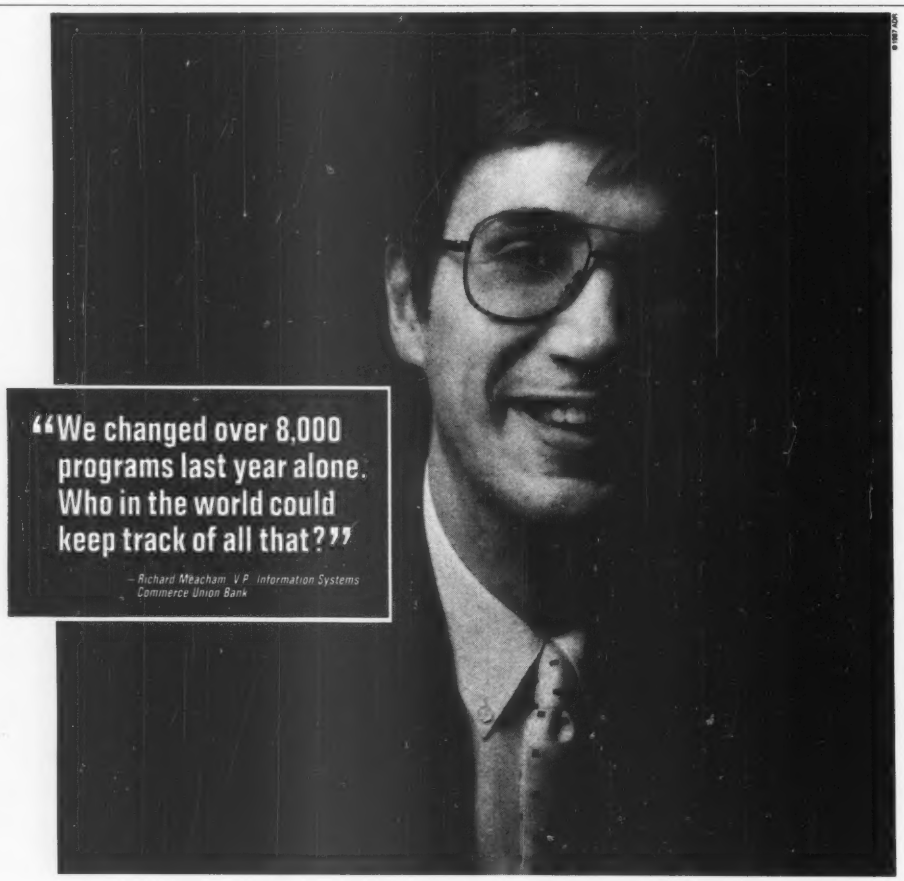
Innovation

CONTINUED FROM PAGE 21

There's a reason for IBM's technological conservatism. When you dominate an industry, you want to keep things the way they are. It's simple economic common sense. As long as users keep doing things the same way, they will tend to stay with the incumbent vendors. If users think about doing things differently, they might shop around. It is in IBM's economic self-interest to perpetuate present methods and to improve them just fast enough to hold on to most customers. An IBM executive who suggests any other policy ought to be fired.

Don't get me wrong. IBM is a fine company, and I have recommended their products many times. Most users don't need innovative technology. "Pioneers are the ones with the arrows in their backs," as the saying goes. Users want results. And there is nothing bad about doing things faster and cheaper, as long as the things one is doing are really the right things to do.

Sometimes, however, the best answer to an information processing need doesn't come from doing the same old things a little bit better, a little bit faster and a little less expensively. Sometimes, the big payoff comes from doing things differently. If that big payoff calls for systems that deal with information in new and innovative ways, the technology isn't likely to come from IBM.


"We changed over 8,000 programs last year alone. Who in the world could keep track of all that?"
– Richard Meacham V P Information Systems Commerce Union Bank

It must have been a programmer who said the only thing that remains constant is change. No sooner is a program completed than changes get made. And so many get made so often that staying in control of it all can be more than humanly possible.

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Making sense

CONTINUED FROM PAGE 20

name. MRP, either in commerical or aerospace and defense applications, is a planning system. The execution of work orders and purchase orders planned by an MRP systems contract has all the necessary logic to maintain the integrity of every contract and related cost throughout its life.

The real problem lies in aerospace and defense contractors trying to apply commercial or specific MRP software without understanding the disciplines needed to make the software system auditable and acceptable to the DCAA and other government agencies. The problem has been compounded by some in the DCAA who have taken a Neanderthal view that is destined to throw out the child with the bath water. Going back to manual ledgers can only make the data more inaccurate and substantially increase the cost of providing effective weaponry to our government and its allies.

The bottom line is that MRP systems contracts, properly implemented and understood by knowledgeable aerospace and defense contractors, has and will continue to contribute to managing the cost-per-schedule performance in the complex matrix of contracts in which defense contractors must operate.

Donald N. Frank
Principal
Plossl and Frank
Florham Park, N.J.

Indy report lacking

Now come on, *Computerworld*. You can do better than the coverage on the Indianapolis 500 race — the world's biggest single-day sports event [CW, May 25].

There are personal computers running rampant in the pit areas, but you failed to mention the fact that Packaged Automated Life/Liability Management, Inc. monitors the race — car by car, all 33 and for the entire 500 miles, and the race is not officially over until they say so.

How about the winner? This year, it is Al Unser Sr., the second four-time winner in Indy history (Bobby Rahal was last year's winner).

So let's get the facts straight next time. But we still know one thing is true — computers are still faster than those Indy cars.

Constance F. Mays
Vice-President
VM Systems Group
Arlington, Va.

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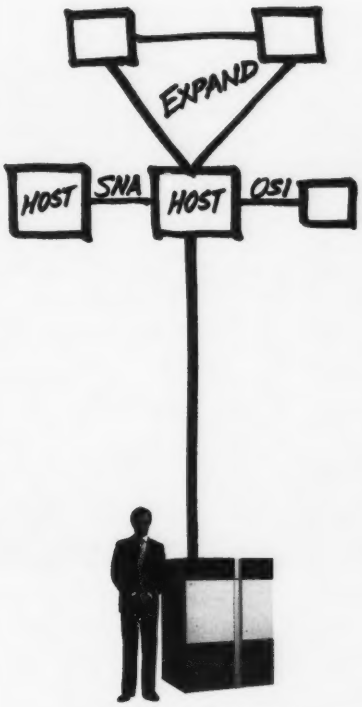

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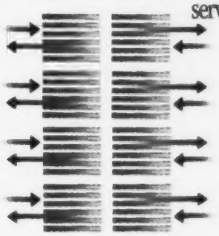

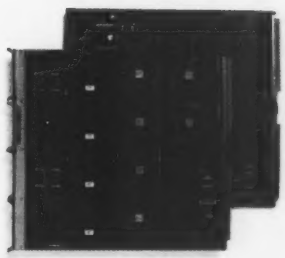

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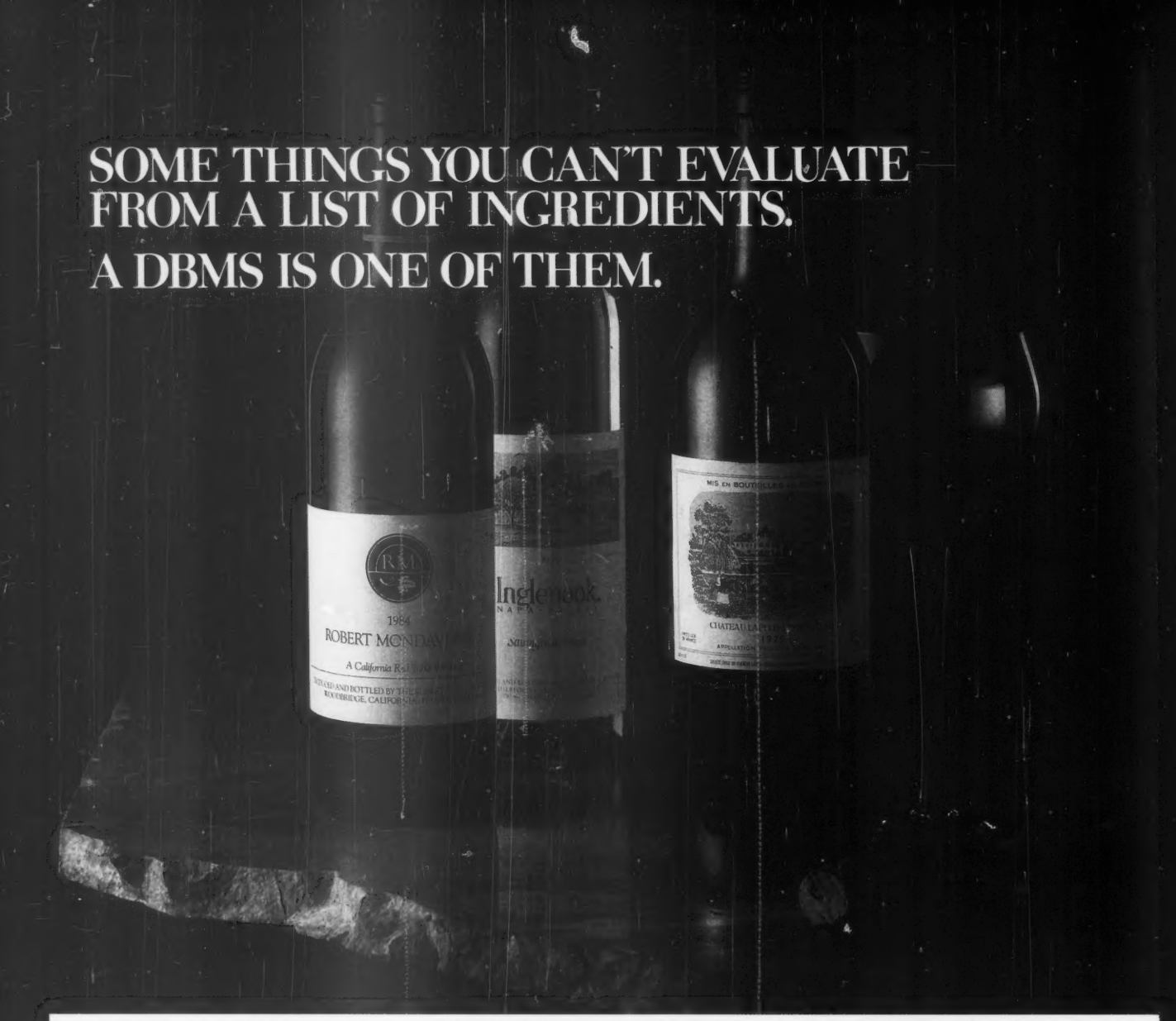
SOME THINGS YOU CAN'T EVALUATE FROM A LIST OF INGREDIENTS. A DBMS IS ONE OF THEM.



When you think about it, relational DBMS products have a lot in common. They're all built around SQL. Most include 4GL tools. They all have a list of features and functions you can check off one at a time. And they all claim high performance.

But once you really get to know relational DBMS products, the differences between them become as clear as the differences between a great wine and a lesser vintage. It's the care in blending quality ingredients that produces a really great product.

And that's why INGRES is now establishing itself as today's DBMS standard.

INGRES runs on everything from mainframes to minis to workstations and PCs. And our new INGRES/STAR, the first distributed DBMS, lets users work with data from all your corporate databases and systems. Anywhere in the world. As a result, just like any vintage product, we're recognized by leading experts in the field. INGRES has been voted "Best DBMS/4GL" by *Digital Review* for two years running.

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SOFTWARE & SERVICES

SOFT TALK

Charles Babcock

Cobol review inconclusive

A public review process is under way to collect comment on the proposed addition of intrinsic functions to Cobol 85. The intrinsic functions would add several low-key, mathematical capabilities to Cobol, but some parties question whether the process of adding them — the addenda process — doesn't dilute one of the chief virtues of Cobol, its stability as a business language.

On the one hand, the advocates of Cobol want to see it enriched with added capability. They want to see it adapt to modern times and continue to grow as a viable language. The terms they use and the positions they take are so closely allied with the whole frame of mind of the computer industry that at first glance it seems impossible to argue with them.

"We want Cobol to be a rich and successful language .... We're keen to see it continuing to improve," says John Triance, the noted English Cobol authority and product development manager for Micro Focus, Inc., an advocate of the addendum process.

"We feel the addendum process is a good way to change the standard without waiting for a wholesale revision," says Bruce Sinclair of Cobol compiler mak-

Continued on page 27

Volume applications generated

Programmers use system along with own Cobol, PL/1 know-how

BY ALAN ALPER
CW STAFF

FORT LEE, N.J. — On-Line Software International, Inc. recently unveiled an application generator for volume transaction processing systems residing on IBM mainframes and compatibles.

Called Intelagen, the application generator consists of a fourth-generation language and a menu-driven front end that is said to enable programmers to generate applications written in standard Cobol or PL/1. The application generator operates in a variety of on-line environments, including CICS, IMS/DC or IDMS/DC, or as a batch program under an OS or DOS/VSE environment, On-Line said.

On-Line is not positioning Intelagen as a "be-all and end-all" for an application's life cycle, but as a flexible source-code generator that builds on a programmer's expertise, noted Irwin Kanopolsky, On-Line's assistant vice-president. Approximately three-quarters of all application development tasks, including documentation creation, are performed by Intelagen, he said.

Intelagen was designed to work with a programming staff's existing development methodology rather than impose a new discipline. "People do not want to have their expertise taken away. So we're selling them a productivity tool which still uses their Cobol or CICS expertise," Kanopolsky said.

Cuts time in half

Intelagen enables programmers to cut application generation time in half, he said. Programmers primarily use English-like 4GL commands. About 10 lines of Cobol code are created for each line of the 4GL code, Kanopolsky noted. "A standard CICS update transaction can be done in less than one day," he said.

Intelagen also allows programmers to combine Cobol code with 4GL level commands, which enables programmers to learn how to use the tool at their own pace, he added.

Another familiarity for programmers is Intelagen's on-line editor, which is similar in form and function to IBM's ISPF, Kanopolsky said. The on-line editor also warns programmers of syntax errors, he added.

Help screens can be displayed by depressing function keys. A built-in data dictionary enables users to store a field definition in a central location and a screen and report generator allow Intelagen to work closely with end users to develop screens, Kanopolsky said.

Maintenance is decreased when generating applications using Intelagen because structured code is written, Kanopolsky said.

Continued on page 29

Monitor rewritten for VSE/SP

BY ROSEMARY HAMILTON
CW STAFF

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) recently began shipping a revamped version of its performance monitor system that is designed for the IBM VSE/SP operating system.

ADR/Look Release 3.0 has a one-time license fee of $12,600. The vendor also offers an IBM MVS version with a $35,000 license.

The previous version of ADR/Look was designed for the older VSE operating system. Release 3.0 can also be used with the non-SP versions of VSE, but it includes a number of facilities that can only be exploited in the newer VSE/SP environment, the vendor said.

One such facility is Task State Analysis, a component of Release 3.0 that is said to allow users to view on-line the status of a given task at regular intervals.

"It tells you where a job is spending time, and that helps you identify the bottlenecks in the system," said David Korz, an ADR/Look development manager.

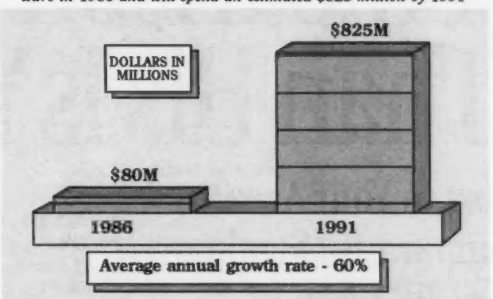
The vendor claimed that be-

Continued on page 34

Data View

European market for artificial intelligence products to grow tenfold

France, Italy, UK and West Germany spent $80 million on AI software in 1986 and will spend an estimated $825 million by 1991



INFORMATION PROVIDED BY INPUT
CW CHART

Uccel fuses acquired line

BY JEAN S. BOZMAN
CW STAFF

DALLAS — Uccel recently said it has integrated the products of California Software, Inc., a company Uccel acquired in December 1986, into its own line.

Uccel's Netman product, a data base that tracks hardware and software configurations in a data center, has been interfaced to four Uccel products. Netman now works with the UCC-1 tape management system, the UCC-7 work load scheduler, the UCC-

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Inside

- DEC enhances corporate videotex with All-In-1 integration. Page 27.
- Focus expands into corporate operations. Page 33.
- Biblos adds PC option to mainframe application development. Page 34.

INFORMIX UPDATE: A QUICK REPORT ON DB2.

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JANUARY 12, 1987 COMPUTERWORLD

Codd: Supra surpasses DB2

INSIDE

Celanese creates software subsidiary/26

NEW THIS WEEK

■ SC

By Charles Babcock

SAN JOSE, Calif. — Edgar F. Codd, president of the Relational Institute here, has concluded that the next release of Cincom Systems, Inc.'s Supra is truer to the relational model than IBM's DB2, even though Supra still lacks a language comparable to IBM's SQL.

Codd reviewed the documentation for Cincom's Supra Release 1.3 and concluded that it adheres to 10 of the 12 rules with which he defined the relational model. Release 1.3 is being tested by Cincom and will not be available until June or July.

Codd compared Release 1.3 of Supra with Release 2 of DB2, which became available in March 1986. DB2 met seven of the 12 rules. IBM is widely anticipated to [illegible] of DB2 this

of all those I have reviewed to date. Assuming that the product performs according to the documentation, IBM's DB2 Release 2 has less fidelity to the relational model than Cincom's Supra Release 1.3," Codd said in a letter to David A. Wood, Cincom's senior product manager for systems software. Cincom had requested the evaluation.

Despite its high rating, Codd [illegible] falls short on two points of [illegible] model as defined by his [illegible] ICW, Oct. 14 and 21, 1[illegible] equivalent of IBM's S[illegible] and offers only [illegible] high-level [illegible] mands.

A d[illegible] need[illegible]

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The seminar series, "The Business Value Of Relational Technology," offers you a comparative look at SUPRA and DB2. You'll see how relational database technology can substantially reduce costs of development and maintenance, plus you'll learn the importance of the "three integrities" (referential, entity and user-defined) to relational implementation.

Sharon B. Weinberg, President of Codd & Date Consulting Group and a former relational database consultant with IBM® responsible for releases of DB2, will review Dr. Codd's point-by-point comparison of SUPRA Release 1.3 and Release 2 of DB2. She'll demonstrate why Dr. Codd concluded that SUPRA adheres to 10 of his 12 basic rules for the relational model, versus DB2's 7 of 12, and explain why he stated, "SUPRA's rating is the highest achieved of all those I have reviewed to date."

Advance registration is requested for the half-day seminars. To register or get more information, call Cincom today. Or, write Marketing Services Department, Cincom World Headquarters, 2300 Montana Avenue, Cincinnati, Ohio 45211.

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DEC videotex upgrade integrates All-In-1

BY NINAMARY BUBA MAGINNIS
CW STAFF

MERRIMACK, N.H. — Digital Equipment Corp. is now shipping Version 3.0 of its enhanced VAX VTX software, which can be integrated with the highest version of All-In-1, DEC's office automation system.

VAX VTX allows the communication of business informaton to large numbers of users throughout an organization, DEC said. Users can opt for VAX VTX when disseminating information enterprisewide and electronic mail for person-to-person links, the vendor said.

VAX VTX also integrates with DEC's WPS-Plus word processing software for soft-copy document distribution using the VAX Integrated Publishing Systems.

Version 3.0 additions

Enhancements include VTX Infobase Structure Tool and Assister (Vista), a videotex application design tool and facilities for direct access to any VTX information base from IBM 3270-type terminals linked to an IBM host, according to DEC.

Vista reportedly enables nontechnical users to design and organize VTX information bases. After the information base is organized, users can create documents using WPS-Plus and transfer them to the VAX VTX information base by specifying that the document is destined for VTX instead of a printer, DEC said.

The VAX VTX Applications Link Utilities connect VTX users to other applications and to critical corporate information such as operating reports, sales figures, budgets and financial data contained in exisiting data processing systems, the vendor said.

IBM 3270 terminal users connected to an IBM host can interact directly with a VAX VTX information base via Decnet and DEC's Systems Network Architecture gateway.

The enhanced software can store and deliver full-screen graphics for VMS-based workstations, making VAX VTX an information delivery vehicle for technical applications in engineering and manufacturing.

VAX VTX support of international terminals includes the Minitel terminal for access to the French national videotex system and DEC's new VTX20 videotex terminal, which DEC said is a VT220-compatible terminal for supporting all European presentation display protocols.

VAX VTX Version 3.0 is priced from $2,630 on the Vaxstation 2000 to $83,130 on the VAX 8978. All-In-1 Version 2.2 is listed from $3,375 on the Vaxstation 2000 to $106,880 on the VAX 8978.

Cobol review

CONTINUED FROM PAGE 25

er Ryan-McFarland Corp.

Jerome Garfunkle, the Litchfield, Conn., Cobol authority and originator of the process, says he wishes the current addendum would go further and add other features to Cobol, such as a Boolean bit facility or a VALIDATE command for validating data. "That's how fourth-generation languages work," he notes.

The advocates of the addendum process make the argument that it took 11 years to get from Cobol 74 to Cobol 85; the existing process is too slow to keep Cobol a contemporary language.

On the other side are the Cobol users, who have a huge inventory of source code and a shrinking staff of programmers to maintain it. "I think there is still a major question of whether the addendum process isn't a backdoor way of postponing the issue of the next major revision," says Lawrence Madison, director of data processing at Travelers Insurance Co.

Added features mean some programmers will delight in adopting them while others will ignore them, causing "the maintenance programmer to spend an inordinate amount of time" figuring out what some other programmer has been doing, Madison says.

Because of this division of opinion, the X3J4 Committee of ANSI has proposed an innocuous change as its first test of the addendum process. Intrinsic functions, which include a limited number of trigonometric functions and statistical calculations, have been advanced and more complex additions have been deleted because the committee wants the first round "to be a victory for the addendum process," Garfunkle says.

As such, this stage of the addendum process won't tell us very much. If intrinsic functions fail to raise public complaints, they will probably be adopted and become part of the Cobol 85 standard. But a more complex proposal that the business world feels is superfluous to daily operations might invoke a storm of protest reminiscent of the reception given the first version of Cobol 85.

Thus, the current trial-balloon addenda is not going to tell us anything. It is intentionally innocuous, and real change, when it comes via the addendum process, will once again tempt the DP community to resist rather than embrace change in which it sees little benefit.

Babcock is *Computerworld*'s senior editor, software & services.

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Data View

Computer Associates' shopping spree

The company has acquired 15 software firms during the last five years

Name	Market	Date Acquired	Price (in millions)
Capex Corp.	Systems software	May 1982	$22 (in stock)
Stuart P. Orr and Associates, Inc.	Financial applications	February '83	$2.1[1]
Information Unlimited Software, Inc.	Micro applications	July '83	$9.5
Sorcim Corp.	Micro applications	May '84	$26.5
Johnson Systems, Inc.	Job accounting software	June '84	$16
Arkay Computer, Inc.	MVS/VSE conversion software	August '84	$0.5[1]
Basic Software Group, Inc.	Micro applications	August '85	*
Value Software, Inc.	Systems software	April '85	*
Management and Computer Services, Inc.	Programmer productivity software	October '85	*
Top Secret (product from CGA Computer, Inc.)	MVS security software	December '85	$25
Software International Corp.	Financial applications	December '86	$24
Integrated Software Systems Corp.	Graphics applications	December '86	$67
Mega Group	Mainframe spreadsheets	December '86	$2[1]
BPI Systems, Inc.	Micro accounting software	May '87	$10.8[1]
L&L Software, Inc.	Micro-based cost accounting	May '87	*
Uccel Corp.	Mainframe systems and banking software	June '87	$800[2] (in stock)

[1] Broadview Associates' estimate
[2] Price based on market volume of Uccel shares as of June 1.
* Dollar value not available

INFORMATION PROVIDED BY COMPUTER ASSOCIATES

Applications

FROM PAGE 25

Using Intelagen, programmers can create documentation, such as a systems flow, screen and report images, file layouts and data cross-reference between Cobol and 4GL code, Kanopolsky noted. Intelagen interfaces to IBM's IMS and Cullinet Software, Inc.'s IDMS. Support for IBM's DB2 and SQL will be offered in the first quarter next year, Kanopolsky said.

Currently available, Intelagen carries a permanent licensing fee of $80,000 per processor and $120,000 per data center. Kanopolsky said the firm's pricing scheme is intended to sway fence sitters who have evaluated application generators but have not yet taken the plunge. "They've looked at other products but found that the price was too prohibitive," he said.

On-Line acquired Intelagen last year from a small West Coast development firm that Kanopolsky declined to identify.

Kanopolsky said users of On-Line's UFO Productivity System who want to generate source code using Intelagen may be able to do so. "If they want to, we may have a way for them to do it," he noted.

The UFO Productivity System, he added, is for users who want to get a production version of an application quickly as well as for those who like a dynamic data dictionary. "For those people who need the security blanket of having source code, Intelagen provides it," he said. Other application generators that produce Cobol source code include such products as Sage Software's APS and CGI Systems, Inc.'s Pacbase.

> "FOR THOSE people who need the security blanket of having source code, Intelagen provides it."
>
> IRWIN KANOPOLSKY
> ON-LINE SOFTWARE
> INTERNATIONAL, INC.

'Cradle-to-grave' approach to CASE

BY CHARLES BABCOCK
CW STAFF

CAMBRIDGE, Mass. — A 32-bit workstation running Unix with a large screen for displaying windows makes the best platform for developing software and in the future is likely to become "a generic item, a commodity," a software development expert predicted recently.

Tony Wasserman, professor of medical information sciences at the University of California at San Francisco and president of software development tool firm Interactive Development Environments, Inc., described the characteristics of the workstation at the First International Workshop on Computer-Aided Software Engineering (CASE) here recently.

Such a workstation would be likely to use a Motorola, Inc. 68020 or other member of the Motorola 68000 microprocessor family. It would run Unix for its ability to host tools that communicate with one another, and it would need a large display to allow multiple windows "because software developers like to do two, three or four things at once," Wasserman said.

Such a workstation should also support Ethernet and Transmission Control Protocol/Internet Protocol communication protocols, he said.

Several workstations matching this description are available, he noted.

Even more important, however, would be the ability of the software developer to utilize some underlying development architecture that allows the tools used at one stage of development to pass on files and specifications to the next stage.

"It's clear that the life cycle coverage is incomplete. There are large areas where tools just simply aren't there yet," he said. Testing is an area where tools are inadequate; where they do exist, they offer inconsistent user interfaces or fail to integrate in other fundamental areas, Wasserman said.

"Where I want to point us is toward the notion of a collection of tools that support cradle-to-grave approaches," he added.

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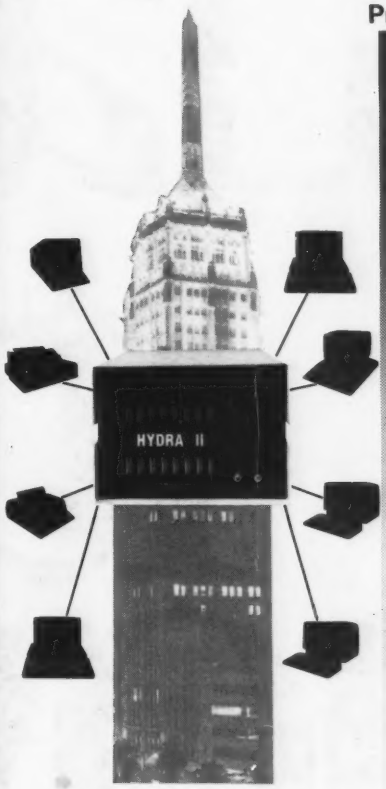

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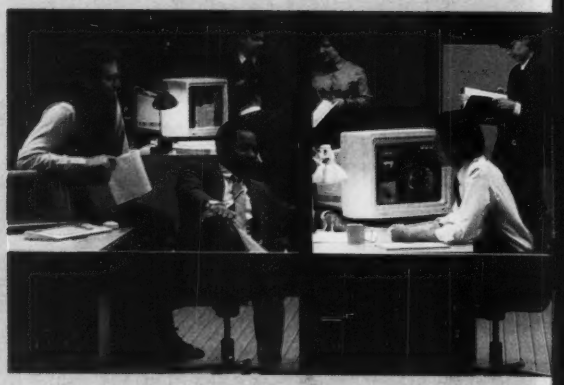

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Focus pressed into production applications

BY CHARLES BABCOCK
CW STAFF

PALM DESERT, Calif. — Information Builders, Inc.'s Focus, long known for its end-user data retrieval and massaging, is being pushed beyond its information center roots into daily corporate operations.

Just how far it has progressed into production systems was evident in talking to members of Focus Users for System Enhancements (FUSE), the independent users group that held its 10th annual meeting here recently.

One example was Lone Star Steel Co. in Lone Star, Texas. The maker of tubular goods for the oil industry faced drastic cutbacks as oil prices fell and oil drilling all but died in the Southwest's oil patch. As production and payroll were cut 75%, Lone Star's management sought ways to adapt that would permit the company to survive.

Can-do attitude

In October 1986, Lone Star's chief executive officer ordered a new company benefit plan put in place within three months. Steve Hill, director of the information center at the time, recalled: "When the vice-president of MIS started discussing who could put the system together, only the information center thought it could."

The core of the information center staff, which had been teaching Focus to end users, became a development team that produced the cafeteria-style plan within its deadline. The new benefit system helped free up $90 million in the company pension fund, which had been overfunded with the job cutbacks. The legal availability of that money became a key to the company's survival as it reorganized into a mainstream steel producer, company spokesmen said.

By the end of the benefit project, the corporate MIS staff had been trimmed from 80 to 15; the information center was phased out, and many of its staff members were sent looking for new jobs. But Hill was deemed too vital to be let go and became the director of support for new human resource systems.

Reflecting on his information center training, he said, "Part of my job is training human resource people to not need me. They do their own reporting, applications and maintenance."

Lou Lovell, manager of salary administration and personnel records at Lone Star Steel, said the switch to a Focus system has reduced the amount of time spent waiting for reports. "Ten percent of the work is maintenance, and 90% is reporting. If you can put that 90% in the hands of the end user, you have saved yourself a lot of time," she added.

Another mainstream corporate user of Focus is Jack Schlosser of Smith Cline Beckman Corp., a Philadelphia pharmaceutical company. Schlosser directs a side-effect reporting operation that analyzes data from worldwide users of Smith Cline products.

Side-effect reporting used to be a host machine operation, using Focus on an IBM mainframe, but Schlosser suggested that a $100,000 annual chargeback could be trimmed to a three-year, $35,000 expense if the system was downloaded to PC Focus on four workstations, a file server and a communications machine on a Novell, Inc. local-area network.

With PC Focus's ability to access host data bases via mainframe Focus, Schlosser's group can collect and analyze the data required for Food and Drug Administration reports and Smith Cline's own research.

There are drawbacks, Schlosser said. The side-effect group must do its own backup, a daily 20-minute operation. The group does not have an audit trail if the system fails prior to backup. "Fortunately, we haven't run into that circumstance," he noted.

The communications machine, an IBM Personal Computer AT with a 640K-byte memory limitation, "kind of chokes" on a main data base and must split it into six files as it parcels out copies to workstation users, Schlosser said.

Nevertheless, he added, his group has scored a hit with upper management. "The cost savings came at an excellent time."

Another user, James Bowler, a project manager for Nynex Corp. in White Plains, N.Y., said his 15-member team will develop a Focus system to measure the performance of switch-repair personnel.

It will replace a system formerly developed by AT&T in its proprietary language, OTSS, which Nynex no longer wants to use. "If we use it, we have to maintain it," he said. Maintaining a system in Focus will be easier than in OTSS, and the future development of the language will be in the hands of a vendor rather than Nynex, he noted.

Sara Zuk, the outgoing president of FUSE, said the group has been an important source of pressure on Information Builders to "put Focus into more mainstream production environments."

Zuk, the information center manager for Norwest Corp., a bank holding company in Minneapolis, said Focus is finding more production uses in her company, and FUSE's lobbying for a COMBINE command, PC-to-mainframe connectivity and greater performance efficiency has given Focus more of a "production program capability."

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Monitor

CONTINUED FROM PAGE 25

cause the new release was rewritten for the VSE/SP operating system, it will have an overall performance improvement over Release 2.3A.

No longer in supervisor partition

ADR/Look no longer resides in the supervisor partition of the VSE operating system, as did Release 2.3A, according to Joseph Murphy, an ADR/Look product manager.

Instead, users can install it in either a user-defined partition or in the power partition, which is a job scheduler.

As a part of the supervisor partition, which is considered the core of the operating system, ADR/Look was competing with several other tasks for the supervisor's time, Murphy said of the older version.

Can function independently

Now, it functions as a subtask of the power partition or as an independent partition.

"What this does is free us up to create some real nice facilities, like graphics support, that the customers have been asking for," Murphy said in reference to future product enhancements.

"Before, we would have been putting too much overhead on the supervisor. Our ability to add to the product was limited," he said.

Uccel

CONTINUED FROM PAGE 25

11 rerun manager and the UCC-9 hardware reliability monitor. The interfaces were written after the acquisition by California Software's programming staff, which still is located north of Santa Monica, Calif.

Netman developer David Tootill, now a vice-president of research and development at Uccel, said he anticipates that the Netman product and its gateways to Uccel products will continue to be marketed after Uccel's merger with Computer Associates International, Inc., announced two weeks ago, is complete.

"I expect there will be no change at all," he said last week, "because Computer Associates has no similar products in this area."

Developed in 1980 by Tootill and others, Netman handles several aspects of running a data center. It monitors the hardware inventory, displaying system status on a screen; tracks the leasing and other financial arrangements made to acquire the hardware; and handles change and problem management. Netman's data base also lists all software applications and on which machines they are being run.

Another new feature of Netman is a gateway to IBM's Network Problem Determination Application, which automatically logs hardware problems into Netman's problem management application, Uccel spokesmen said.

Netman can be run in the following IBM environments: MVS/TSO, MVS/CICS, VS1/TSO, VM/CMS and PC-DOS VSE/CICS. Netman is currently priced at $45,500 for the MVS and VM/CMS environments. The price is scheduled to be raised to $49,600 by June 26, Uccel said.

Biblos adds micro option

BY ROSEMARY HAMILTON
CW STAFF

NEW YORK — Biblos Technology, Inc. recently added a personal computer option to its application development software while also enhancing the basic package.

Biblos Release 2.0 is currently available and runs under IBM's MVS operating system. Licenses for Release 2.0 start at $75,000, the company said.

The PC option, which costs $2,000 per microcomputer to license, allows users to develop and test applications on the PC and then port them to the mainframe for production use, according to the vendor.

The mainframe portion of Biblos has been enhanced to automatically recompile code from the microcomputer, the vendor said.

Cuts development-time costs

"This should cut costs on mainframe development time," said Janet Baldwin, marketing manager at Biblos. "In the PC mode, we emulate CICS. You can do all your testing there and then bring it over to the mainframe."

The vendor does not provide a mainframe-to-microcomputer communications facility, allowing customers to make use of Irma boards or whatever link they have in place, Baldwin said.

The new release also includes a prototyping component that can be used for modeling on-line portions of applications and a Help facility.

Biblos, first introduced in 1983, was designed for Cobol and CICS environments.

The basic package includes support for the IBM VSAM file system, according to Ari Sternberg, president of Biblos.

Optional support for IBM's IMS, Cullinet Software, Inc.'s IDMS data base management system and Software AG of North America, Inc.'s Adabas is available from Biblos. Support of one additional data base costs $15,000, while support of two costs $20,000, Biblos said.

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Mercury costs $250,000. A renewable license costs $25,000 per quarter.

Internet Systems, 17th Floor, 200 W. Madison St., Chicago, Ill. 60606.

Applications packages

The **CAE Systems, Inc.** division of **Tektronix, Inc.** has enhanced its **Merlyn-S** standard cell layout system, a physical design system for standard cell and block layout.

The software is said to offer fully automatic placement and routing as well as interactive editing tools. Features of Merlyn-S include capabilities for data base creation, graphical floor-planning and routing.

Specific enhancements include interactive floor-planning controls, automatic power and ground tapering and channel compaction and routing of designs with any number of macro blocks located anywhere in the layout.

The new version of Merlyn-S is priced from $50,000. It is said to run on Digital Equipment Corp.'s VAX and Apollo Computer, Inc. and IBM systems.

CAE Systems, 5302 Betsy Ross Drive, Santa Clara, Calif. 95054.

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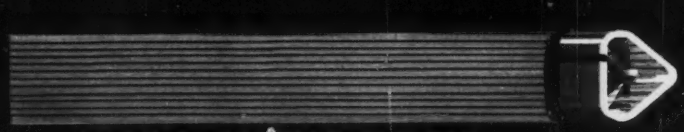

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Utilities

Goal Systems International, Inc. has released **FAQS/MVS**, an on-line job-status monitor for IBM and compatible mainframes.

FAQS/MVS is said to provide MVS/SP and XA users with commands for determining the status of the systems or jobs within the systems. It allows programmers to control the execution of their jobs from their terminals without any operator intervention.

Commands include Activity, for displaying the status of jobs executing; Console, for listing the contents of any active MVS console; and Display, for showing the contents of virtual storage for any job.

FAQS/MVS costs $7,420.

Goal Systems, 5455 N. High St., Columbus, Ohio 43214.

Keyword Office Technologies Ltd. has introduced a Digital Equipment Corp. VAX-based user interface software program called **Keypak Plus 1**.

Keypak Plus 1 is said to allow integration of Keyword's Keypak Editable Document Exchange (EDE) services with DEC's All-In-1 office automation system.

Keypak EDE is a VAX/VMS layered product that is said to allow a VAX user to exchange documents with other VAX users.

Keypak Plus 1 is an extension of the standard All-In-1 interface and uses All-In-1 electronic messaging for document distribution. It costs from $2,000 per copy for a Microvax II to $6,000 per copy for a VAX 8800.

Keyword Office Technologies, 2816 11th St. N.E., Calgary, Alberta, Canada T2E 7S7.

Data base management systems

DBA Companion, a data base management security system said to provide automated application-access control in Oracle Corp.'s Oracle data base management system environments, has been announced by **D&N Systems.**

DBA Companion is said to perform Grant/Revoke SQL statements as users are inserted and deleted from application-specific user classes. It consists of a set of nine screens for assigning resources, tables, privileges and user classes for each application.

DBA Companion is priced from $395 to $28,800.

D&N Systems, 153 Watson Road, Belmont, Mass. 02178.

Development tools

Biblos Technology, Inc. has announced **Biblos Release 2.0**, a systems generator designed for IBM mainframes in Cobol/CICS environments with USM, IDMS, Adabas and DL/1 data bases.

Release 2.0 includes a personal computer option said to permit full systems development on PCs. Other features include a screen-oriented technique for analysis design and decomposition of systems, the ability to model the on-line portion of the application, a Help facility, an interactive debugger and a file-maintenance facility.

Biblos Release 2.0 is priced from $75,000 to $100,000.

Biblos Technology, No. 1220, 2 Penn Plaza, New York, N.Y. 10121.

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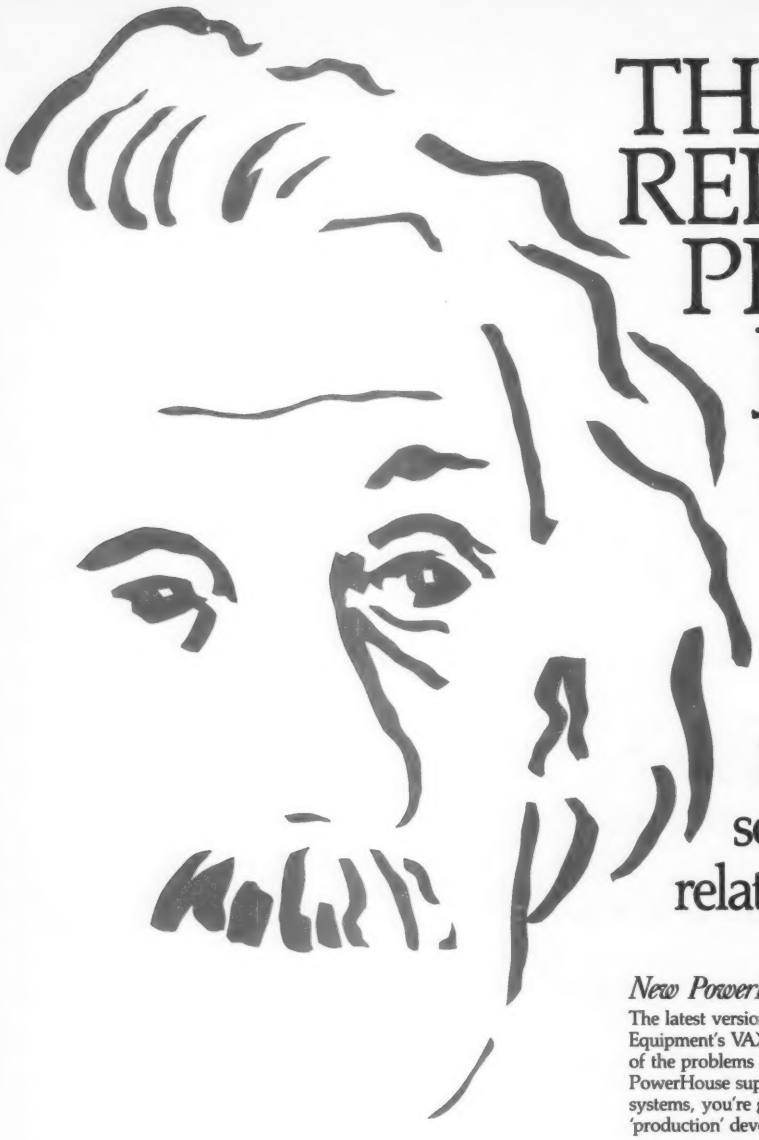

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SMALL TALK

William Zachmann

Prime time software

Having tried many calendar/time-management programs, I had pretty much concluded that there was no way I would ever use any of them. None seemed to offer much practical improvement over my $5.50 Month-At-a-Glance appointment book.

Upon receiving a review copy of Prime Time, a $99.95 personal time-management system for IBM Personal Computers and compatibles from Wiseware, Inc., in Costa Mesa, Calif., I fully expected to be disappointed.

As it turns out, Prime Time is a useful program that stands a good chance of winning its way into the select inner circle of programs that I use regularly.

A big part of Prime Time's appeal is the ease with which the calendar can be manipulated. A cleverly designed set of entry options and facilities for rearranging things eliminates most of the inconveniences found in other time-scheduling systems.

For example, Prime Time offers a flexible way of scheduling recurring appointments automatically. An automatic date generator facility gives

Continued on page 43

IBM cagey in granting licenses

Firm plans to avert infringements on Micro Channel bus

BY ED SCANNELL
CW STAFF

IBM recently emphatically denied published reports and speculation that it has approached manufacturers of compatible systems about licensing the Micro Channel architecture used in three members of its Personal System/2 family.

But while IBM has not actively tried to license the Micro Channel technology, it reportedly will grant a license under a utility patent to interested manufacturers that clearly demonstrate that what they seek does not infringe on any other IBM patents. A company spokesman said IBM has some 10,000 utility patents.

"Vendors must come to us and identify which patent they have a need for. We don't tell them which patents are in the Micro Channel, nor do we clear their products," said Bob Liesegang, a member of IBM's commercial relations department.

While several IBM spokesmen failed to give specific examples of utility patents as they relate to the Micro Channel, Chet Heath, who helped develop the Micro Channel design team, cited a typical example.

"You could come up with a concept of how to buffer data to and from a tape drive. Regardless of how you built it or what components you used to build it, you would own that concept," Heath said.

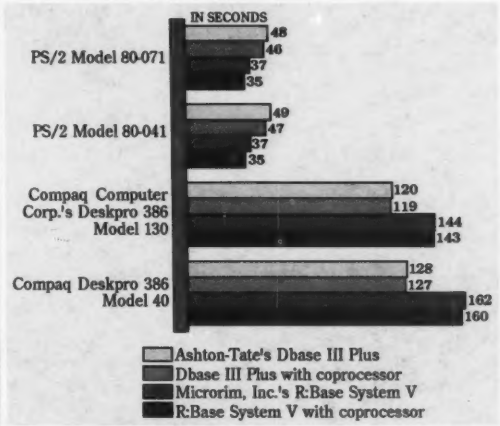
Two patent lawyers interviewed agreed that a utility patent is a patent on a combination of steps, not obvious in nature, that allows a product to function better than previous products.

Continued on page 42

Data View

IBM caches in with PS/2

Benchmarks show IBM's Personal System/2 Model 80 runs popular software significantly faster than the competition



INFORMATION PROVIDED BY NATIONAL SOFTWARE TESTING LABORATORIES
CW CHART

Memory up for Amiga

BY DAVID BRIGHT
CW STAFF

WEST CHESTER, Pa. — Hoping to boost its currently minor penetration of business markets, Commodore Business Machines, Inc. recently announced an Amiga personal computer with an internal expansion chassis and more memory than previous models.

Built around Motorola, Inc.'s 7.14-MHz 68000 microprocessor, the system, priced at $1,995, uses an optional add-on board to run IBM Personal Computer-compatible software simultaneously with packages developed for the machine's proprietary operating system,

Continued on page 42

FCC hunts emissions outlaws

BY DOUGLAS BARNEY
CW STAFF

ATLANTA — For the third Comdex in a row, undercover Federal Communications Commission agents scoured the Comdex/Spring '87 show floor in an attempt to crack down on products that fail to meet FCC radio emission certification standards.

FCC officials estimated that some 60% of computing devices investigated at Comdex earlier this month failed to meet emission certification requirements.

Investigators, however, did not visit the booths of vendors such as IBM, which FCC officials said has a proven compliance record. Officials declined to identify vendors with products found to violate the standards pending receipt of formal violation notices.

Despite the large number of uncertified devices, the level of compliance has been improving, according to J. Jerry Freeman, coordinator of the FCC's Computer Marketing Enforcement

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Inside

- Removable mass-storage systems offer solution to data security, transport problems. Page 40.
- Sharp readies shipment of transportable PCs. Page 42.
- Microsoft releases Basic Compiler. Page 46.

Intel's Bader says much of the future is here

Rich Bader is the general manager of Intel Corp.'s Personal Computer Enhancement Operation, which is perhaps best known for creating the Lotus/Intel/Microsoft Expanded Memory Specification (EMS) and the Above Board line of memory products.

An Intel employee for the past nine years, Bader has held a number of marketing and strategic planning positions within the company. He has contributed to the development of the 80386 microprocessor as well as board- and systems-level products.

Bader took time out from his schedule at this month's Comdex/Spring '87 in Atlanta to talk to Senior Editors Ed Scannell and Douglas Barney about a variety of issues centering around Intel's 80386 processor and the IBM OS/2 operating system.

What are the prospects for the 80386?

Just as OS/2 is the software platform of the future, the 386 is the hardware platform of the future. Why? Because it's compatible with all of the software currently out there that runs on the 8086 and 80286. The 386 also has a number of unique capabilities such as its virtual mode that allows you to do 386 control software, which is the only way to multitask existing DOS applications reliably. It also has 32-bit capabilities, and there a number of packages already taking advantage of that, like Ansa Software's Paradox, Symantec's Q & A and Fox Software, Inc.'s Foxbase. So while the 386 hasn't been shipping in systems for a full year yet, we are already seeing 386 control software and 32-bit applications. That stands in stark contrast to the 286 and OS/2.

Rich Bader

Some board makers say it is nearly impossible to design a multifunction board for IBM's Micro Channel architecture. Does this concern you?

Our primary interest is not in selling hodgepodge cards but in providing a specific solution for specific customer needs. What I think is one of the significant opportunities in the Personal System/2 is to do expanded memory boards. Not only expanded but similar to today's Above Boards, where we have expanded memory and memory for OS/2 combined in the same product. We think high-density boards along those lines are doable.

Are you going to do any boards that are compatible with EMS and [AST Research, Inc.'s] Enhanced EMS?

In our opinion, there is no reason to do anything like that.

So it's EMS all the way?

You bet. I think the reason some people are interested in the other expanded memory technologies is because of the multitasking capabilities that it provides through some software packages. We think the best way to do multitasking of existing appli-

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'Disks to go' offer transport ease, security

BY JAMES A. MARTIN
CW STAFF

An increasing number of vendors are selling removable mass-storage systems, or "hard disks to go," as a solution to users' data security and data transport problems.

Iomega Corp. in Stamford, Conn., with its Bernoulli Box, was one of the first to introduce this type of alternative storage product.

But in recent months, several challengers offering their own versions have appeared on the scene.

Disk-like floppies

Some sell floppies that act as hard disks.

Data Technology Corp. in Santa Clara, Calif., offers Take Ten, a floppy disk drive subsystem with up to 10M bytes of storage on a 5¼-in. hard-coated floppy.

A similar product in appearance, although incompatible with Take Ten, was designed by Eastman Kodak Co.

Both are manufactured by Verbatim Corp.

Meanwhile, Konica Technology, Inc., the Japanese-based camera company, unveiled last fall the KT-510, a 5¼-in. floppy disk with up to 10M bytes of storage.

The KT-510 uses a standard floppy-disk jacket and is compatible with 360K- and 1.2M-byte 5¼-in. floppies, according to the vendor.

Because of its hard coating, Kodak's Take Ten is not compatible.

Floppy-like disks

And there are hard disks that act something like floppies.

Tandon Corp. has the PAC 286, an IBM Personal Computer AT-compatible that features Tandon's removable 30M-byte Winchester hard disk, The Data Pac, according to the vendor.

This product operates as the main storage system and is encased in a shock-resistant box.

User concerns about the security of data, however, are expected to hinder the level of acceptance for these removable high-capacity storage devices.

At E. F. Hutton & Co.'s headquarters in New York, large-data transfer requirements are handled through mainframe virtual-microcomputer disk storage on-site.

If the data needs to be ported to another location, a satellite wide-area network is used.

"We don't like sending data through the mail," said Bernie Weinstein, first vice-president in charge of information systems and telecommunications.

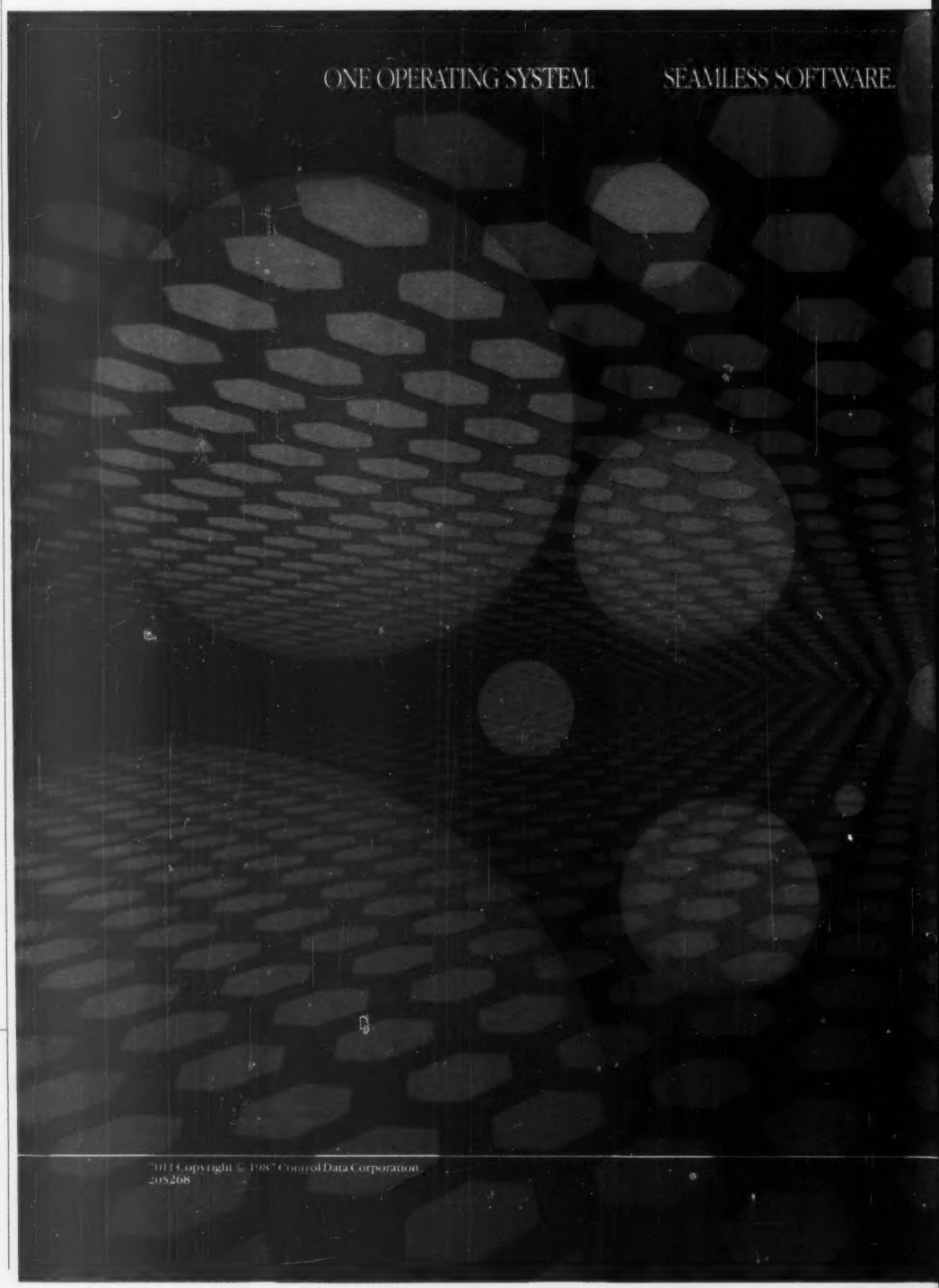
Ultimately, it is the promise of future storage technologies that poses a threat to these products.

Local-area networks, featuring high-capacity memory storage and backup, are increasingly common and, in most cases, would eliminate the need for storage subsystems.

Emerging optical-disk and compact disk/read-only memory technologies are another threat to storage subsystems.

Meanwhile, the storage capacity of 3½-in. microfloppies will only increase, and a 20M-byte microfloppy will be a standard after 1990, predicted Phil Devin, an analyst with Dataquest, Inc.

Dataquest also forecasts that integrated-circuit memory chips, such as the kind used on automated teller machine cards, will eventually become a key storage medium.



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Bader

FROM PAGE 39

cations is through the 386. It is much faster and more reliable than techniques used in the past.

What is the potential of 80386 Windows, or of other control programs?
While 80386 control software can't provide everything that OS/2 brings, it brings an awful lot of what users want today with a much smaller amount of disruption and change.

Can an 80386 board in an 8088-based machine run 80386 control programs?
We don't have a product like that yet. But as a statement of direction, it is my organization's intention to provide a range of 386 enhancement products that will allow you to enhance just about any IBM PC AT and XT.

Are there any drawbacks to running OS/2 on an Intel board in older machines?
There is nothing inherent in the PS/2 that we have seen that makes it run OS/2 faster or better than the classic architecture.

IBM recently said you should count on having 3M bytes of random-access memory if you want to run OS/2 Extended Edition.
Right. That's why Intel hasn't announced its memory card. All that is coming out so far are 2M-byte boards for the Models 50 and 60. We believe 2M-byte boards are insufficient.

How technically feasible is it, over the next year or so, to be able to offer a 16M-byte memory unit on a single board?
It will take megabit chip technology to get there.

Won't that take another three or four years?
[Because of the packaging,] I don't think you'll be able to use megabit chips and get 16M bytes on a board on the Micro Channel.

Are you looking at expansion boxes for the PS/2?
There is a school of thought that says that by the time you are running systems like that [with 16M bytes of RAM], the PS/2s are going to be obsolete, so that by the time OS/2 is ready, PS/2s won't be competitive machines anymore. So there really don't need to be any major strategic commitments to PS/2s, because two or three years down the road, you are going to want something new.

What about the PS/2's ability to handle multiple processors? Doesn't that give them a whole new set of possibilities?
We believe the distributed processing capabilities supported by Micro Channel are very attractive. However, there are a lot of different ways to do that, and any way you do that has to be supported by the operating system. OS/2, as I understand it, doesn't provide the facilities to allow you to do all of that wondrous stuff. You'll be able to put multiple processors in to do communications and graphics, but to have multiple processors in there and to have each of them doing general-purpose computing, OS/2 is not designed to do that.

Is the technology now at a stage where an MIS/DP shop could begin to get at protected mode?
I have been talking to a large number of customers with significant in-house development shops that, in some cases, are doing mission-critical applications and pretty advanced research. You can bet that all of those companies are going to 386 systems across the board and looking for LISP compilers to take advantage of the 386s.

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Sharp reinforces assault on portable market

Escalates lightweight war with PC-, AT-compatible laptops boasting supertwist LCDs

ATLANTA — Sharp Electronics Corp. stepped up its attack on the portable computer market by introducing two IBM Personal Computer AT-compatible transportable systems and two IBM PC-compatible laptop systems earlier this month at Comdex/Spring '87.

Sharp is planning for shipments to begin sometime in the third quarter, according to a company spokeswoman.

Of the four machines introduced, the two transportables currently fall under the U.S. trade sanctions against Japan, she said.

The transportables each weigh approximately 21 lbs and are built around an Intel Corp. 10-MHz 80286 microprocessor. Both units come with 640K bytes of memory, expandable on the motherboard to 1.6M bytes, one expansion slot and serial and parallel ports as well as ports for hooking up color and monochrome monitors.

The systems also include supertwist LCDs that are backlit and provide 640- by 200-pixel resolution with four shades of gray. An 11.4-lb printer that attaches to either unit is optional.

The PC-7202, with a preliminary price of $2,995, includes dual 5¼-in. 1.2M-byte floppy disk drives.

The PC-7221, tentatively priced at $3,995, includes one floppy disk drive and a 20M-byte hard disk drive.

The laptop systems, which were designed around NEC Corp.'s V40 microprocessor, also use supertwist LCD screens.

Prices start at $1,295 for a unit with 256K bytes of memory, expandable to 1.6M bytes, one 3½-in. floppy disk drive and a parallel printer port.

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IBM licenses

CONTINUED FROM PAGE 39

Some lawyers said they are eager to see how broad the IBM patent claims will be and if IBM has patented the entire Micro Channel. "It's always interesting whether they [the patents] will cover all computers that may have a similar systems architecture or maybe just a subclass of those computers that have features not too many people care about," said Gerald Lynch, an attorney with Kenway & Jenney in Boston.

The patents for which IBM has filed are not expected to be made public for at least 18 months. However, Heath and others at IBM cautioned that the Micro Channel architecture is made up of more than just utility patents. They said it also consists of proprietary microcode and "other trade secrets," which fall under the category of design patents, which IBM said it will never license.

"While the Personal Computer was clonable, we have gone to great lengths to make the new one [PS/2] unclonable," Liesegang said.

Asked if it is technically feasible to produce a system containing the Micro Channel with a bus or chip set that supports the existing architecture, Heath said it could be accomplished but that he did not see why anyone would want to attempt it.

"It was a tough job to build that system," said Heath, who noted that IBM began the project back in 1983. "And it's going to be a lot of work for somebody else. Of course, it's easier to copy someone else's work. But then IBM hasn't changed its position on intellectual property rights, and we will take whatever steps necessary to protect those rights."

Amiga

CONTINUED FROM PAGE 39

the vendor said. With the earlier Amiga 1000, expansion took place externally.

According to Rich McIntyre, senior vice-president of sales and marketing, the machine is useful for traditional business applications, such as word processing, financial analysis, accounting and data base management, as well as for graphics-oriented vertical markets like computer-aided design and desktop video. McIntyre said more than 500 software packages are currently available for the machine but added that before buying, "Users must first find or define a need for the Amiga."

The system is said to be compatible with the Amiga 1000. Some 120,000 Amiga 1000 units were shipped between the product's late 1985 introduction and the end of 1986, according to International Data Corp., a Framingham, Mass.-based market research firm.

The $499.95 Bridge Board that provides IBM PC-compatibility is built around an Intel Corp. 8088 microprocessor, Commodore said, and comes with Microsoft's MS-DOS 3.2. In comparison, the external Sidecar MS-DOS option for the Amiga 1000 lists for about $1,000.

The Bridge Board requires a 5¼-in. floppy disk drive. Commodore said it is also planning an AT-compatible Bridge Board for introduction at a later date.

System and Bridge Board availability are planned for this summer. McIntyre said a competitively priced hard disk drive will be available by September.

Prime time

CONTINUED FROM PAGE 39

two different and complementary ways of specifying dates. The select-a-date option lets you schedule recurring events based on the date itself.

One can easily schedule events based on the "qualities" of the date. You might decide to schedule a meeting on every Wednesday in the third week of each month, for example, or every Tuesday, or 10 days after the end of each quarter.

Alternately, you can specify recurring events based on a starting date and some interval (every three weeks, for example). Prime Time allows you to specify daily, weekly, monthly, quarterly and yearly intervals in integer multiples.

Appointments can also be moved from one time or day to another. The duration of the appointment, notes associated with it and other pertinent information move right along with the entry.

But Prime Time does much more than just let you schedule and rearrange appointments.

Organizes tasks within calendar

Perhaps its handiest feature is a facility for handling tasks to be accomplished. Like appointments, these can be entered either individually or as recurring tasks, such as preparing a monthly report. All of the automatic facilities for entering appointments can be used for entering tasks as well.

Tasks are entered with a description, start and intended completion dates, a priority and a type classification. At the option of the user, currently active tasks may be displayed in order of date, priority or type. Currently active tasks, as well as scheduled appointments, are associated with each date on the calendar.

Like dates, tasks can also be moved, modified, added and deleted. In addition, tasks can be marked as completed. Completed tasks appear on the daily task list with a line through them until purged by the user.

Yet another innovative feature is the ability to delegate tasks. These appear as assigned tasks with the initials of the individual to whom the task has been assigned. They appear on the daily task list when their completion date has arrived.

The program can be simply invoked when needed or, alternately, can be run as a terminate-and-stay-resident task invoked through a hot-key combination. It requires 118K bytes of memory in the latter mode but is thereby instantly available for scheduling changes and so forth.

Yet another appealing feature of Prime Time is that it also keeps a directory data base of people and information about them that also can be used as an autodialer for telephone numbers through a Hayes Microcomputer Products, Inc. or compatible modem.

Generous notes fields associated with the data base make it easy for a salesman, for example, to keep key information about clients.

On-line Help facility

The program itself is menu driven, and an on-line — although not context-sensitive — Help facility quickly makes the user independent of the manual.

A "User Profile" menu gives the user ample control over basic options. Appointment alarms may be set if desired, and parameters may be established for how soon before the appointment the alarm is to sound and for how long.

Appointments may be either overlapped or not, depending on the user's preference. The normal business day start and end times and schedule increments may be set. Dial codes for functions such as credit card calling may be specified and associated with telephone numbers.

Prime Time is not copy protected and is quite straightforward to install and use. A good tutorial is included that provides an introduction to the features of the program. All things considered, Prime Time is a useful program that delivers excellent value for the cost.

Zachmann is vice-president of research at International Data Corp.

FCC

CONTINUED FROM PAGE 39

Program in Virginia Beach, Va.

A year ago, some 80% of the devices investigated at Comdex/Spring '86 were uncertified.

The wave threat

Products that emit an excessive amount of radio waves pose a threat by interfering with other devices, including police and fire department radios, as well as radios and televisions, FCC officials said.

The issue concerns users because the FCC has the authority to force organizations to stop using uncertified devices if complaints are made about interference.

In addition, computers that do not have the proper shielding may interfere with other computers, sometimes causing them to spontaneously reboot, FCC officials said.

In addition to computers themselves, add-on boards — especially accelerator cards — must also be certified.

FCC officials advise users uncertain of a product's certification status to call the FCC, especially since an increasing number of devices contain fraudulent FCC stickers.

The FCC also provides a modem number that provides information on the certification status of a variety of products.

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NEW PRODUCTS

Systems

Xepix, Inc. has introduced a Unix-based interactive publishing system called the **Xepix Model BG**.

The Xepix Model BG is packaged in a personal computer cabinet and comes with a high-resolution monitor with 1 million, 2 million, 4 million or 8 million displayable pixels and monochrome, gray scale or color with 256 displayable colors out of 16 million. The text and graphics system is said to support two users.

The system operates at up to 5 million instructions per second, the vendor said, and includes 1M byte of memory, expandable to 8 bytes; a 1M-byte floppy disk drive; one expansion slot and one parallel and two serial ports.

The Xepix Model BG interactive publishing system is priced from $15,995.

Xepix, 51 Lake St., Nashua, N.H. 03060.

Software applications packages

Database Applications, Inc. has announced a report-writing system called **DNPL/Reporter**, designed for use with Ashton-Tate's Dbase II and Dbase III data bases.

Features of the software include report writing with English-like sentences for sorting, formatting and screening; statistics; joining of data from different files; and the creating of executable programs. DNPL/Reporter also allows for the creation of tabular reports with totals, subtotals, averages and standard deviation, any compound function, headings and current time and date.

DNPL/Reporter costs $89.50.

Database Applications, 400 Wall St., Princeton, N.J. 08540.

Project Software & Development, Inc. has introduced **Qwiknet Professional**, a project management software program for the IBM Personal Computer AT, XT and compatibles.

Qwiknet Professional is a multiple-project, multiple-calendar software program said to measure actual performance in terms of schedules, expenditures and resource usage. It also produces standard project-management reports, such as bar charts, histograms and logic diagrams.

Other features include a proprietary window environment, connectivity with the vendor's Project/2 mainframe and minicomputer program and the ability to import and export other ASCII files.

Qwiknet Professional costs $1,495.

Project Software & Development, 20 University Road, Cambridge, Mass. 02138.

Software languages

Microsoft Corp. has announced the release of **Microsoft Basic Compiler** for personal computers running the Xenix System V/286 operating system.

The product is said to allow programs written in Microsoft's MS-DOS version of Microsoft basic and GW-basic Compiler — as well as those written in Microsoft Basic Interpreter for the Xenix environment — to be compiled with little or no modification.

Microsoft Basic Compiler includes support for Indexed Sequential Access Method and allows users to create and distribute stand-alone programs without requiring a copy of Basic to run them.

The Microsoft Basic Compiler is priced at $695.

Microsoft, Box 97017, 16011 NE 36th Way, Redmond, Wash. 98073.

Software utilities

A software utility called **Me2**, said to provide fault-tolerant disk operation for IBM Personal Computer AT-type machines, has been announced by **Atlantic Microsystems, Inc.**

Me2 is said to use redundant on-line hard-disk storage. It enables automatic backup of data on two separate hard disk drives within the same PC, so that both drives have identical copies of the data.

Features include transparent backup and support for up to four 32M-byte partitions per drive.

Me2 costs $285.

Atlantic Microsystems, 8A Industrial Way, Salem, N.H. 03079.

Microway, Inc. has announced **Powerdialer**, said to provide users of Lotus Development Corp.'s 1-2-3 with automated dialing of phone numbers stored in Lotus 1-2-3 work sheets.

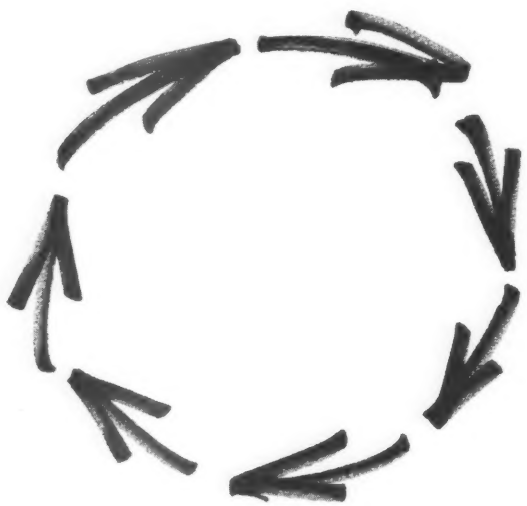
Powerdialer supports automatic least-cost routing, local or long-distance exchange identification and extended local-area dialing. It comes with automated phone book and tutorial work sheets and documentation and is compatible with Hayes Microcomputer Products, Inc.-compatible modems.

Powerdialer costs $79.95.

Microway, P.O. Box 79, Kingston, Mass. 02364.

Software enhancements

Vector Automation, Inc. has announced its computer-aided design software, **Cadmax 2D** and **Cadmax 3D Version 3.0**, which run on Compaq Computer Corp. 386 personal computer workstations.



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Of course, the best hardware and software is only part of the right LAN solution. At NYNEX, your system will be designed, installed, and maintained by the network specialists with a 100 year heritage in business communications.

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Business Information Systems

Cadmax software features a two-level menu structure said to allow up to 75 English-language menu options to be displayed at one time.

Cadmax 3D displays eight views on the screen simultaneously. Each view can be windowed and scaled independently. Construction tools such as projections, tangency and object snapping are included.

Cadmax 2D includes menu language, macro language, bill of materials and symbol geometry. It costs $3,350. Cadmax 3D adds three-dimensional wire frame. It costs $3,950.

Vector Automation, Village of Cross Keys, Baltimore, Md. 21210.

Persoft, Inc. has announced **Version 2.0** of its **Smarterm 240** communications software.

Smarterm is said to allow an IBM Personal Computer or compatible to communicate with minicomputer and mainframe hosts and to emulate the display and keyboard characteristics of various Digital Equipment Corp. and Tektronix, Inc. graphics and text terminals.

Version 2.0 is said to include emulation of the DEC VT241 color graphics terminal and support for IBM's Enhanced Graphics Adapter when displaying DEC Regis graphics images.

Smarterm 240 is priced at $345.

Persoft, 465 Science Drive, Madison, Wis. 53711.

Printers/Plotters/ Peripherals

Networx has introduced the **Networx A-B Switchbox**, said to allow users to add an unlimited number of peripherals.

The A-B Switchbox utilizes RS-232 connections. It can link a personal computer with a modem and printer even when the PC has only one RS-232 port, the vendor said. It can also connect computers with plotters, terminals or other peripherals. The A-B Switchbox includes one input and two output connectors on the rear panel and a two-position lever on the front.

The A-B Switchbox is priced at $99.95.

Networx, 1913 Atlantic Ave., Manasquan, N.J. 08736.

Toshiba America, Inc. has introduced the **P321SL** 24-pin dot matrix printer.

The printer is said to feature IBM emulation and a tractor for fanfold paper. An automatic fanfold bypass allows users to print on cut-sheet paper without removing the tractor-fed paper. Printing modes are accessed by touch controls. Printing modes include font, pitch, emulation, lines per inch, page length and four preset printer setup configurations.

Other features include 32K bytes of resident memory, 216 char./sec. printing in draft mode and 72 char./sec. in letter-quality mode.

The P321SL is priced at $749.

Toshiba, 9740 Irvine Blvd., Irvine, Calif. 92718.

Board-level devices

The **Juki 7200** 24-pin flatbed-type dot matrix printer has bowed from **Juki Office Machine Corp.**

The Juki 7200 is said to feature a front and rear paper-loading capability as well as the ability to print multipart single forms. Print speed is 90 char./sec., 108 char./sec. in letter-quality mode and 270 char./sec. and 324 char./sec. in draft mode.

The Juki *7200 dot matrix printer*

The Juki 7200 comes with a 7K-byte buffer memory and features Centronics Data Computer Corp. parallel or RS-232C serial interfaces.

The Juki 7200 is priced at $2,445.

Juki Office Machine, 20437 S. Western Ave., Torrance, Calif. 90501.

Computer Peripherals, Inc. has announced the **386 Memoire**, an add-on memory board for the Compaq Computer Corp. 386 Deskpro.

The card is said to operate in the host's 32-bit mode at speeds up to 16 MHz with no wait states. A 25-pin connector matches the connector in the Deskpro that provides access to the 32-bit memory.

A 1M-byte board using four banks of 256K-byte chips costs $845. A 2M-byte board using eight banks of 256K-byte chips costs $1,395.

Computer Peripherals, Suite 5, 2635 Lavery Court, Newbury Park, Calif. 91320.

MSA Group, Inc. has reduced the price of its **Turbocad** two-dimensional computer-aided design system for the IBM Personal Computer and compatibles.

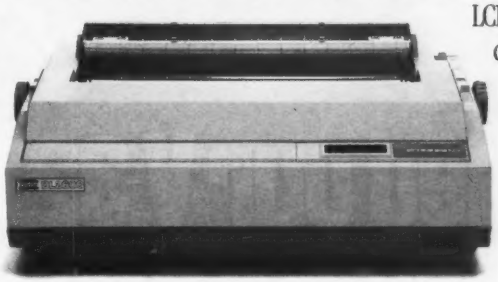
Turbocad is said to feature automatic dimensioning, advanced drafting features and dot matrix printing. It uses pull-down menus and offers a context-sensitive Help facility. It provides up to 256 line thicknesses; 100 line and arrow types; user-definable hatching patterns and grid; unlimited zoom; and three cursor types.

Turbocad is priced at $99.

MSA Group, Suite 370, 12021 Wilshire Blvd., Los Angeles, Calif. 90025.

FUJITSU'S 24-WIRE DL2600 PRINTER

The printer that stands the test of time.



Throughout each business day, the DL2600 24-wire, dot-matrix printer will quietly and reliably handle your printing needs.

8:35 AM — FAST!
Coffee is just starting to brew, but the new DL2600 in Purchasing is already wide awake, printing reports at a blazing ten seconds per page.

9:22 AM — GREAT PAPER HANDLING!
Marketing needs a proposal on letterhead. Now. No problem. The DL2600 automatically backs out and parks the computer paper, then loads the letterhead. Getting back to the reports is as simple as pushing a button.

1:31 PM — QUIET!
A meeting on the quarterly statement is held while the DL2600 quietly purrs nearby, printing spreadsheets for Finance.

3:15 PM — POWERFUL!
Time to handle a mailer for Sales. Using the 16-character English language LCD front operator panel, it's simple to change type styles, including big letters and italics, too.

7:30 PM — GOOD INVESTMENT!
When you look at the productivity, the quality, the different kinds of printing handled during the day, the DL2600 makes your company look good on paper.

Print Speed	288 cps/draft, 190 cps/report, 96 cps/letter quality
Operator Panel	16-character Liquid Crystal Display
Emulation	IBM® Graphics Printer® and Diablo 630® API (plus Epson JX-80® on the color model)
MTBF	6,000 hours
Ribbons	Transparency ribbons Black and color ribbons

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But then, it's really what you'd expect from the recognized leader in high speed modems. In fact, more data communications professionals prefer Codex than any other brand.* And it's our high speed modem expertise that has allowed us to make a modem that not only meets, but exceeds the V.32 standard.

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So, you can be sure of continuous high quality transmission over a wide range of line conditions. This now allows you to cut connect time and save money by sending data at up to 9600 bps full duplex over ordinary dial lines.

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To find out more about the Codex V.32 modem, call **1-800-426-1212,** Ext. 235. Or write Codex Corporation, Dept. 707-35, 7 Blue Hill River Road, Canton, MA 02021-1097. You'll discover that when we tell you about a V.32 with high speed performance and reliability, we're not blowing smoke.

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DATA STREAM

Patricia Keefe

Networking roundup

Thirty-four and counting flavors of Netware. Despite rumors that Novell, Inc. is working on a Unix version of its Netware networking software, Novell Vice-President Craig Burton insists that Unix isn't exactly high on Novell's list of priorities.

On the other hand, work on Macnetware is progressing nicely. Burton declines to say whether Novell's Netware for the Apple Computer, Inc. Macintosh will be out before the end of the year, but he does say Apple and Novell were working closely on the project.

It seems Apple has found a new attitude as far as Netware is concerned.

Fall fashions. Rumors about an Ungermann-Bass, Inc.-IBM OEM contract continue to circulate. The deal has Ungermann-Bass supplying either Transmission Control Protocol/Internet Protocol or Ethernet (or both) to Big Blue, depending on the source. Whichever, don't expect to see an announce-

Continued on page 50

Race is on to network PS/2s

BY ELISABETH HORWITT
CW STAFF

Support for IBM's Personal System/2 product line has become the latest competitive yardstick among networking archrivals 3Com Corp., Novell, Inc. and Banyan Systems, Inc. But while all three companies are racing to migrate their networking software to the currently available Microsoft Corp. MS-DOS 3.3-based networking system for the PS/2 family, they are taking longer than some users would like to come up with boards that can interface with IBM's new Micro Channel bus.

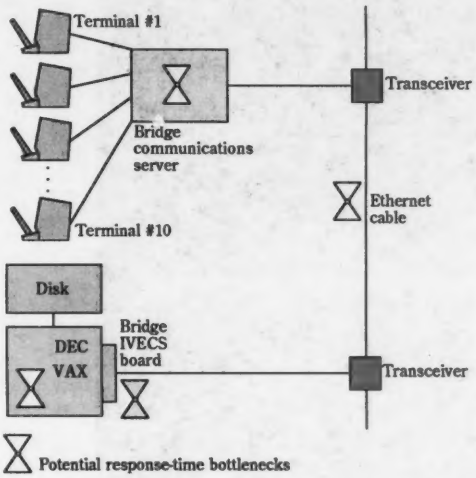
Both 3Com and Novell claim that this month they will begin shipping the PS/2 Micro Channel versions of their network software suites. But the software is not much good without network boards that interface with the Micro Channel — IBM's standard bus for PS/2 Models 50, 60 and 80. And those interfaces are currently in short supply, according to industry sources.

"Right now, only one company provides Token-Ring and PC Network boards for the PS/2 — and that's IBM," said Scott Haugdahl, senior systems specialist for Minneapolis-based consulting company Architec-

Continued on page 51

M. W. Kellogg draws response time from a soda straw

While MIS has developed a rough-and-ready way to test response time over a given server-to-host connection, it has not yet invested in a product to pinpoint bottlenecks across a Decnet-XNS LAN



CW GRAPHICS: SUSAN ALDAM

Care and feeding of a LAN

BY ELISABETH HORWITT
CW STAFF

HOUSTON — In 1985, when The M. W. Kellogg Co. was in the midst of exchanging Four Phase Systems, Inc. office automation systems for Digital Equipment Corp. minicomputers, its MIS technical staff took advantage of the general transition to justify a local-area network (LAN) for the engineering firm's 20-story headquarters here.

Two years later, the LAN consists of some 50 Bridge Communications, Inc. Ethernet servers linking 400 user terminals, as well as multiple DEC, IBM and Hewlett-Packard Co. hosts and assorted peripherals. The

Continued on page 52

CXI boosts gateways

Novell Netware link, 40-session gate debut

BY ELISABETH HORWITT
CW STAFF

ATLANTA — A 40-session network-to-mainframe gateway and a gateway that supports parent company Novell, Inc.'s Netware were among the introductions made by CXI, Inc. at the recent Comdex/Spring '87 show.

CXI's PCOX/Coax-Mux coaxial interface board is said to convert an IBM Personal Computer or Personal System/2 into a local-area network (LAN) gateway that supports up to 40 concurrent sessions between networked PCs and an IBM mainframe host through an IBM 3274 or 3174 cluster controller.

Prior to the product's introduction, "No vendor could support more than five sessions on a LAN gateway to a cluster controller," Novell Vice-President Craig Burton claimed.

The PCOX/Coax-Mux gate-

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Inside

- U.S. Robotics strengthens alternative modem standard drive. Page 50.
- Mitek distributes SNA services to TCP/IP LANs. Page 53.
- Cisco Systems announces CCITT and DDN X.25 support for gateway servers. Page 53.

printf("Hello, MAINFRAME world\n");

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We designed the compiler listing and cross-reference to make programs easy to follow and errors easy to find. An extensive library offers functions from Kernighan and Ritchie and the Lattice PC C compiler. The run-time library produces explicit numbered error messages and a traceback of active function calls if an error occurs.

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U.S. Robotics seeks standard

BY DONNA RAILANDI
CW STAFF

SKOKIE, Ill. — U.S. Robotics, Inc., strengthening its drive to promote an alternative CCITT V.32 dial-up modem standard, has signed an agreement with Data Race, Inc. in San Antonio, Texas.

U.S. Robotics will provide Data Race with microprocessor source code, schematics and parts required for manufacturing an asymmetrical full-duplex 9.6K bit/sec. dial-up modem that is compatible with U.S. Robotics' Courier High-Speed Technology (HST) modem. In exchange, Data Race will give U.S. Robotics the rights to certain proprietary, patented technology that describes split-speed modem design.

The $995 Courier HST modem uses an asymmetrical, full-duplex modulation technique that divides a dial-up phone line into high- and low-speed channels, automatically assigning the high-speed channel direction based on data-flow demand. The modem uses trellis-coded modulation on the high-speed channel.

"There is a huge marketplace where true [symmetrical] full-duplex is not required," said U.S. Robotics President Casey Cowell. Building modems to V.32 specifications is expensive and complex, with conforming modems costing from $3,000 per piece, he said. A statistical multiplexer — where input from many operators is crunched into a single channel, sent along the phone line, split out again and sent back the same way — would be an ideal use for V.32 standard modems, he explained.

U.S. Robotics, along with Telebit Corp. and British Telecom, have proposed their dial-up modem schemes to Study Group 17 of the CCITT committee, said Dale Walsh, vice-president of engineering at U.S. Robotics. The three companies, along with a variety of government administration groups and communications carriers in the study group, should decide on a non-V.32 standard for dial-up by the fall, he said.

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Net roundup

CONTINUED FROM PAGE 49

ment before the end of the year, a source close to the company says. Incidentally, it's a smart IBM supplier that keeps an alternate plan on the back burner. Fickle IBM is wont to dump partners when they least expect it (witness Sytek, Inc.'s sad case).

What's going on? A surprising and growing number of industry analysts and users seem to think there's more than meets the eye about IBM's 14-month shortage of Token-Ring network boards. Hardly anyone buys IBM's standard excuse of backlogged orders. Hey, Armonk, even the immensely successful Personal Computer AT was never in short supply for that long. One popular theory links the scarcity of adapter cards to some mysterious IBM agenda.

Serving all LAN-kind. A group of Chicago-area network dealers have launched LANDA, the Local-Area Network Dealers Association. This would-be national organization is seeking chapters in 15 major cities nationwide. What's in it for network managers? Increasing professionalism and better service and support from your local supplier, not to mention industry gossip.

When it rains, it pours. The August issue of LANDA's "The Network Report" takes a close, critical look at "the eclipse of Proteon." The report notes that the token-ring vendor has been plagued by a number of ills, among them an inability to get along with Novell, which no longer distributes Proteon, Inc.'s hardware; an overdistribution of its "complex and not well-understood product"; rumors that the company is discreetly looking for a buyer; "lackluster" marketing and "premium" pricing; and the departure of the majority of its regional sales personnel and its vice-president of sales. The report adds, with a final jab, "You can see why we might want to suggest a closer look before an unequivocal recommendation of Proteon is made." Well, I guess so.

Marriage made in heaven? One rumor racing through the financial community a few weeks ago had Microsoft Corp. buying 3Com Corp., its partner in LAN Manager development. "It's not as farfetched as you might think," says Dave Terrie, editor of Patricia Seybold's "Network Monitor" newsletter. Microsoft is looking for a way to mesh dealer sales — 3Com's forte — with OEM sales, he adds. Other arguments for such a match, says Thomas White, president of the Consulting Group of The Seybold Group, Inc., is 3Com's need to be perceived as a software company, Microsoft's limited grasp of the networking business and both firms' perception of Novell as a major rival.

Another stock to watch. Don't be surprised to see Fox Research, Inc. go public by year's end, Fox executives hinted at Comdex/Spring '87. Also reportedly coming from Fox is support for IBM's Token-Ring as well as Ethernet networks.

Keefe is a *Computerworld* senior editor, networking.

Race is on

CONTINUED FROM PAGE 49

ture Technologies, Inc.

And yet this monopoly does not seem to be giving IBM networking products any significant sales advantage over 3Com and Novell, according to Robert Nash, a regional support manager for Richmond, Va.-based value-added reseller Little Systems, Inc., better known as Dardick. "I have one client, a law firm that is implementing a 200-node network, which chose PS/2 Model 30s over Model 50s, because the Novell network works on a 30 but not a 50 as yet," Nash noted.

The Model 30, unlike the higher end PS/2 models, does not incorporate the Micro Channel. The client chose Novell software running on 3Com Ethernet cards — Model 30s for workstations and "Compaq Computer Corp. units as servers, since the Model 30 is not powerful enough for this job," Nash said.

Customers are unwilling to go with IBM's networking hardware for two reasons, Nash said. "First, they don't feel the IBM Token-Ring is as proven as Ethernet; second, the Token-Ring cards are not easy to get," he said.

Settling for stopgaps

Dardick has sold a lot of 3Com and Novell networks to customers who would "sure like the high-end PS/2 line for servers" but are willing to settle for stopgaps until the third-party vendors come through with PS/2 support — hopefully later this year, Nash added. Once the Micro Channel PS/2 interfaces are ready from Novell and 3Com, customers can convert their Compaqs and Model 30s into high-end workstations, Nash noted.

3Com has announced an Ethernet adapter that will interface with PS/2 Models 50, 60 and 80 with 3Com's Etherseries network, which in turn supports the vendor's 3+ networking software suite; however, shipment will not be until "sometime before the year's end," said Jack Moses, 3Com's Ethernet product manager.

The Micro Channel's new architecture, which incorporates smaller expansion slots, and a 32-bit bus for the Model 80 version have stymied vendors other than 3Com. Alloy Computer Products, Inc. introduced the Hi/2 Micro Channel host interface adapter at Comdex/Spring '87. The adapter links the vendor's PC-XBus and Plus4 networking systems to the PS/2 Models 50 through 80. But the Hi/2 does not take advantage of the Micro Channel's greater address space, admitted David Friesen, Alloy director of strategic marketing. Alloy is working on slave CPU cards that can link directly into the Micro Channel, but "it could take a while, since the Micro Channel requires that we fit everything into a smaller card," Friesen said.

Banyan, whose specialty is network servers that support a wide variety of local-area network (LAN) interfaces, also appears to be struggling to overcome the Micro Channel barrier. The company is currently concentrating on developing a PS/2 Model 80 version for its Virtual Networking System (Vines). "For the Model 80 to be a server will take a Vines rewrite — more than just software drivers but a whole new bus structure," said Carol Wolicki, Banyan spokeswoman. The company has promised to eventually bring out Vines for the less powerful, Intel Corp. 80286-based Model 50 and 60, but this project is not a high priority, Wolicki said. "We don't think there is a big demand for the Model 50 and 60 as servers," she added.

Both Banyan and Novell support PS/2 Models 50 and 60, as well as the IBM Personal Computer-compatible Model 30, as workstations on their networks. "We already support IBM's Token-Ring Adapter/A for the PS/2 and the PC LAN program, which is all that is needed for workstation support," Wolicki said.

Also at issue is when, and whether, various third-party networking vendors will migrate their systems to IBM's future releases of OS/2 and Extended OS/2. Novell reportedly has not yet committed itself to producing an OS/2 version of Netware.

3Com is "working with Microsoft almost daily so that we can be first with an OS/2-, LAN Manager-based server product, sometime in the first quarter of 1988," 3Com Chairman Robert Metcalfe said. But 3Com has made no commitment to Extended OS/2. "We don't even know how much of the system IBM will reveal [to third parties]," Metcalfe said.

CXI gateways

CONTINUED FROM PAGE 49

way is said to work in conjunction with the new Coaxial Multiplexer version of CXI's PCOX/GW-3270 server software to provide host connections to both IBM PCs and PS/2s on a LAN.

The gateway is priced at $1,100, and the software costs $850. Both products are slated to be available in July.

PCOX/GW-3270 software will also run on PCOX, IBM or Digital Communications Associates, Inc. Irma coaxial boards or with PCOX remote boards, according to CXI.

CXI also announced that all PCOX 3270 coaxial and remote LAN-to-mainframe gateway software will now support Novell's Netware SPX LAN interface.

The Netware SPX LAN interface is said to allow from five to 64 host sessions to be distributed to IBM PCs and PS/2s on a Novell LAN, depending on which PCOX gateway is used, CXI said.

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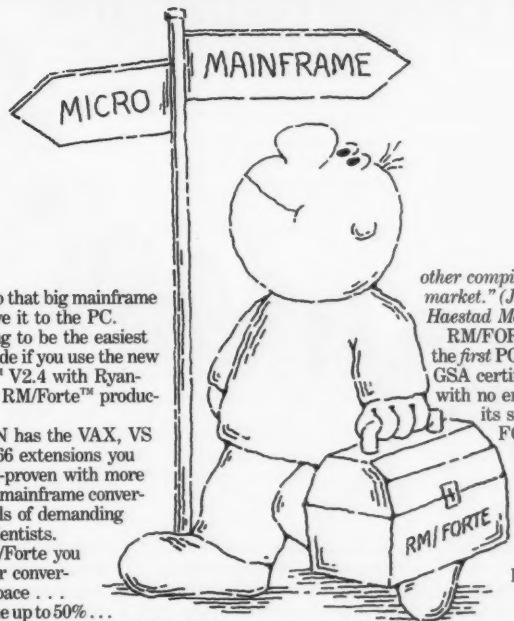

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Care of LANs

CONTINUED FROM PAGE 49

technical staff has learned a number of new skills in its efforts to ensure that users can access those resources in a reliable and timely fashion.

Networking has greatly increased the efficiency and cost-effectiveness with which these resources are delivered, according to Michael Key, MIS manager for computer technology at M. W. Kellogg.

The company's pre-LAN installation used "miles and miles" of different types of cabling systems to support various computers, and users frequently had both an asynchronous terminal and an IBM 3270 terminal on their desks, he explains. Now, all computer equipment shares one cabling system, and Bridge servers and protocol converters enable users to access all network resources through one terminal.

However, the LAN installation has been a mixed blessing for MIS technicians whose job it is to maintain networking hardware and software and to ensure acceptable service levels on the complex multivendor network. The acquisition of two of Bridge's Network Control Server (NCS) 150s has greatly eased that load, according to David Malacoff, who heads M. W. Kellogg's technical support staff in charge of LAN network management and development.

For example, Malacoff says the NCS 150s allow him to maintain and manage the interfaces on all 50 Bridge servers from a centralized location so that he no longer must "run around the floors" doing manual updates.

Prior to the NCS 150s' installation, Malacoff had to go throughout the headquarters to collect server-resident floppy disks that contained Ethernet addresses, protocol translations and configurations for each port as well as macros that make it easier for users to perform basic network functions such as log on and routing. He says he would then bring the floppy disks to his office, update them to reflect changes, do a series of backups that took up to two hours and put them back in the servers.

Now, he says he can store all of that information on the NCS 150s, download it remotely to backup disks and update configurations on the servers.

The NCS 150s also monitor error rate and notify the operator of network failures. They collect network data and upload it to a DEC VAX for later analysis. An internally developed software program analyzes user productivity based on the amount of time spent on the network, and an SAS Institute, Inc. SAS System application generates error reports and network-utilization curves.

Measuring network traffic for possible response-time bottlenecks is complicated by the fact that the Bridge portion of the network uses the Xerox Corp. Network Systems (XNS) communications protocols, while the DEC portion uses Decnet. While the Ethernet LAN carries both types of packets, the NCS 150s are programmed only to monitor XNS packets and thus cannot collect Decnet-generated traffic statistics, Malacoff explains. In addition, M. W. Kellogg has developed its own software for measuring response time on the DEC Vaxcluster.

When the software reports that response time exceeds 10 seconds, programmers monitor the system to determine which user and workstation are responsible for the overload. However, the programmers lack tools for determining whether the problem is network- or host-related.

The company's Ethernet is not overloaded at this time, so the lack of an overall network monitoring system is not a serious barrier to maintaining acceptable response-time levels. However, the volume of Decnet traffic is growing as M. W. Kellogg adds IBM Personal Computer-based graphics workstations that download files from VAX-based systems from Intergraph Corp. MIS is, therefore, on the lookout for a network analyzer that can handle both XNS and Decnet packets, along with other protocols such as Transmission Control Protocol/Internet Protocol. One product under consideration is Sniffer from Network General Corp.

The soda straw test

Meanwhile, M. W. Kelloggs' MIS technicians have invented their own inelegant but effective method of measuring response time across the network. It is dubbed "the soda straw test" because straws are used to keep the autorepeat keys depressed on all 10 terminals on a Bridge server. As each terminal is added to the test, statistics are taken to measure the server and host performance to determine the network capacity as the load increases.

M. W. Kellogg estimates that one terminal with the autorepeat key depressed is equivalent to eight concurrent users on the network. Performance statistics, such as number of packets and bytes sent per second, are taken from the servers as each terminal is added to the test. "The soda straw test is an attempt to solve a perceived performance problem by balancing flow control across the network servers and the buffers on the VAX," Malacoff says.

The MIS technicians have found, however, that network performance is not always a matter of numbers. The company established a help desk as a focal point for user calls and queries on all computer-related problems. Between 50 and 60 calls come in on "good days" and more than 150 come in on "bad days," the firm says. Approximately 20% of all calls relate to network problems, according to Key.

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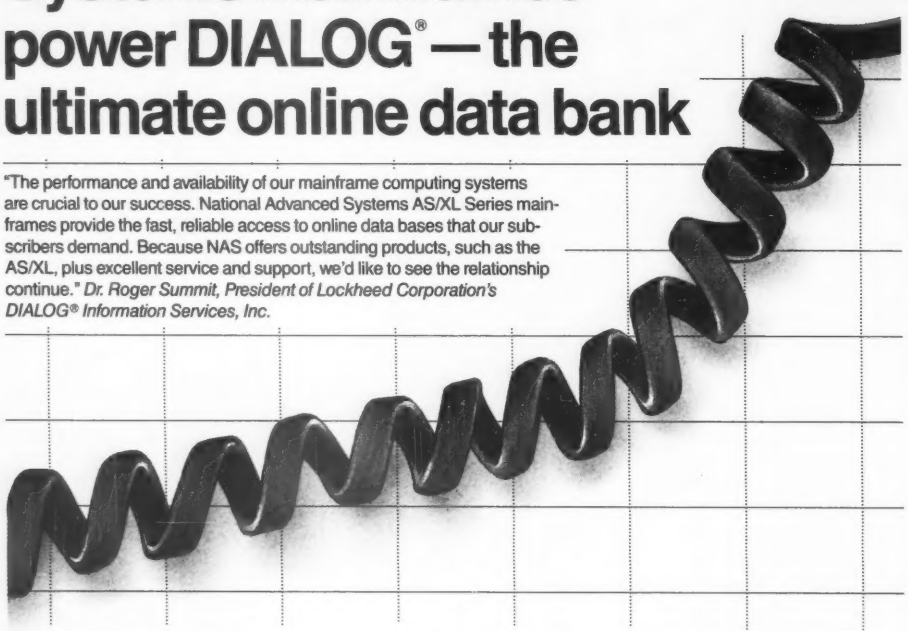

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NEW PRODUCTS

Local-area network hardware

Compression Labs, Inc. has introduced **Rembrandt 56**, a full-motion, desktop color-videoconferencing system said to support coast-to-coast video calls.

Rembrandt 56 is a video coder/decoder that is said to allow users to place video calls over private and switched data networks. It offers user-selectable transmission speeds from 56K to 384K bit/sec. Features include digitized voice, data encryption and enhanced graphics.

Rembrandt 56 integrates with Compression Labs' Rembrandt Desktop Video Station and IBM Personal Computers and compatibles for local-video conferencing over a local-area network and with dedicated or switched networks.

Rembrandt 56 costs $68,000. A five-station desktop videoconference system costs about $115,000.

Compression Labs, 2305 Bering Drive, San Jose, Calif. 95131.

Local-area network software

American Video Teleconferencing Corp. has upgraded its **In-Synch** teleconferencing software, which is said to allow personal computer users to compute simultaneously.

In-Synch allows users of the same application package to run the program simultaneously and interactively on different personal computer workstations. Enhancements to the software include support for the Lotus/Intel/Microsoft Expanded Memory Specification and compatibility with IBM Personal System/2 Models 30, 50 and 60.

In-Synch is priced at $295 or $495 for a package containing two units.

American Video Teleconferencing, 110 Bi-County Blvd., Farmingdale, N.Y. 11736.

Network management

Mitek Systems Corp. has announced implementations of its **Systems Network Architecture** (SNA) **Presentation Services** for Digital Equipment Corp. VMS-based VAX and Microvax computers and IBM PC-DOS-based Personal Computers.

Mitek distributes SNA 3270 and SNA 3770 services to Transmission Control Protocol/Internet Protocol Ethernet local-area networks. The services are said to manage and share, in real-time, the necessary protocols and functions between a homogeneous SNA environment and a diverse Ethernet network.

The SNA Presentation Servers are priced from $21,000 to $29,500.

Mitek Systems, Suite 100, 2033 Chennault Drive, Carrollton, Texas 75006.

Links

Enhanced versions of the **5251/11** and **5251/11 Plus** communications boards, designed to allow IBM Personal Computers and compatibles to communicate with IBM's System/34, 36 and 38 minicomputers via twinaxial cable, have been introduced by **AST Research, Inc.**

The enhanced boards are said to support IBM 5251 Model 11 and 5291 or 5292 Model 1 terminal emulation as well as an advanced bidirectional file transfer system. On the enhanced 5251/11 Plus, the ability to run up to seven display and printer sessions concurrently is also supported.

The 5251/11 and the 5251/11 Plus cost $892 and $995, respectively.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

Protocol converters

Cisco Systems, Inc. has introduced **CCITT X.25** and **Defense Data Network X.25** standard software support for its AGS gateway servers.

AGS systems may now be configured to interconnect Transmission Control Protocol/Internet Protocol and X.25 networks.

Prices start at $11,598.

Cisco Systems, P.O. Box 475, Menlo Park, Calif. 94026.

File servers

The Network Connection, Inc. has announced a line of **file servers.**

The line of six models includes the TNC/A, with 10-MHz one-wait state operation, 1M byte of random-access memory, 1.2M-byte floppy and 40M-byte hard disks. The TNC/B is identical to the NC/A except for an 80M-byte hard disk.

Prices range from $4,500 to $17,850.

Network Connection, 1352 Union Hill Road, Alpharetta, Ga. 30201.

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Lines/Page	66-88	66-88
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Protocol	5225	5225

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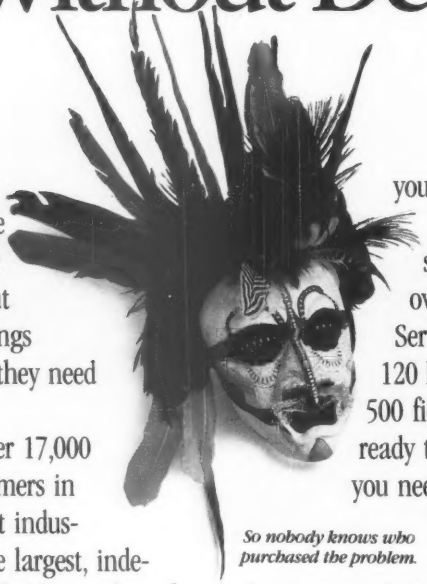

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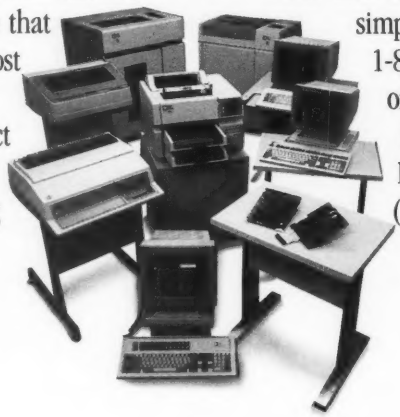

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HARD TALK

James Connolly

High-speed race heats up

Progress in the superconductor field is speeding along as fast as the trains that the technology's boosters think can someday be driven by superconducting motors, and the benefit for computer users may arrive sooner than anyone expected even as recently as a few months ago.

Competing research laboratories seem to be playing leapfrog with their claims of breakthroughs in the development of materials that can carry electricity without resistance. The substances are seen as useful in transportation, power transmission and computers.

The talk about superconductors may appear esoteric at present. For example, one of a string of announcements from IBM in April laid claim to the development of materials that operate at temperatures high enough to be of practical use. That temperature was 68 degrees Kelvin, which equals 337 degrees below zero on the Fahrenheit scale and is much, much cooler than the average computer room. Such numbers

Continued on page 67

Users say DPS 7 top system

Survey shows Honeywell boosts overall satisfaction; Amdahl posts gains

BY JAMES CONNOLLY
CW STAFF

DELRAN, N.J. — Once the lowest ranking vendor in user satisfaction, Honeywell Bull, Inc. continued a climb to the top, where it joined Amdahl Corp. at the head of the list, in the 1987 Datapro Research Corp. report on mainframe user satisfaction.

Honeywell Bull's gains came from the strength of its DPS 7 small mainframe and took place four years after the company sat at the bottom in overall satisfaction in 1983.

Five of the six vendors rated by users received higher overall satisfaction scores than they did in the 1986 survey. The only company that saw its score slip was Unisys Corp., which scored better as Burroughs Corp. in 1986 than as the combination of Burroughs and Sperry Corp. this year. However, Unisys had the distinction of posting some of the best scores and some of the worst results, particularly with systems mentioned in less than 10 responses.

Meanwhile, individual systems cited for special merit were Honeywell Bull's DPS 7, the IBM 3090 and Amdahl's 580 series. No systems earned the special merit rating last year, which entails an overall satisfaction score of at least 3.2 on a four-point scale, at least 20 user responses and no ratings lower than 2.8.

Datapro, a market research

Continued on page 65

UPDATE

The long arm of the portable

ANTHONY RUSSO

BY ROSE MULA
SPECIAL TO CW

When Jerry Short, manager of court consulting services for the California Judicial Council, needed help monitoring the state's current inventory of 200 million court cases — plus 18 million new cases per year — he found his solution in the supermarket: bar codes and portable data terminals.

Short's use of portable terminals is no longer so unusual. Sales of such devices are soaring, causing a flurry of activity among niche vendors that are scrambling to claim market share.

Kidder, Peabody & Co. industry analyst Gray Glass estimates that sales in today's

Continued on page 59

IBM CPU field still vulnerable

BY STANLEY GIBSON
CW STAFF

TEMPE, Ariz. — Departmental computing is still fertile ground for IBM competitors to penetrate IBM mainframe accounts, according to a recent study by The Sierra Group.

The progress recently made by Digital Equipment Corp. and others will not abate in the immediate future, the market research firm, based here, reported. On the contrary, their departmental momentum will continue as satisfied customers add non-IBM — particularly DEC — equipment to existing installations. "DEC users are happier than IBM users, both in departmental systems and networking," said Marty Gruhn, Sierra Group vice-president.

"DEC will remain IBM's most formidable competitor through 1987 and, barring any missteps, through 1988. Where DEC has already made its inroads into its

Continued on page 66

Inside

- Household Finance brings info pools under one roof. Page 57.
- EMC VAX boards use 1M-bit RAM technology. Page 66.
- Mitsubishi adds analog-input color monitor. Page 68.

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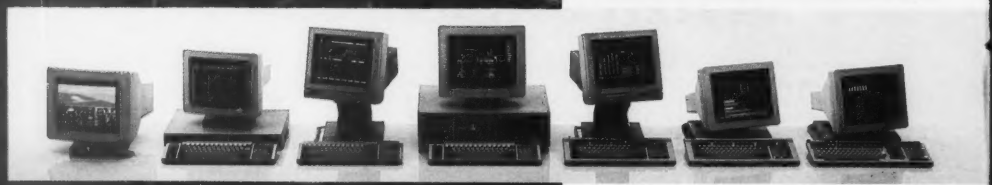

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Firm swan-dives into networking waters

Household Finance unites 50 varied workstations into single information net

BY JEAN S. BOZMAN
CW STAFF

PROSPECT HEIGHTS, Ill. — Until recently, managers at Household International, Inc., the parent company of Household Finance Corp. (HFC), worked on nearly 50 unattached workstations, about 10 of them IBM Personal Computers. In some cases, vital information was stored on index cards and in manila folders and could not be accessed by others at the head office of the $2.7 billion corporation.

But recently, Household International decided to leverage the separate pools of information into a single network. The company now uses departmental computers to manage its Household Financial Services Group and Household Manufacturing, Inc. subsidiaries.

HFC is part of the financial services group, while Household Manufacturing makes the Thermos and Scotsman brands of household goods.

This systems concept of tying the varied workstations together has connected the freestanding PCs and NBI, Inc. workstations into a coherent system managed by NBI System 66 and Series 500 minicomputers. Strands of twisted-pair wires connect what were previously islands of information.

The NBI minicomputers now act as file servers, repositories of micro software and gateways to high-speed laser printers scattered throughout two floors of the firm's offices.

Until 1985, the IBM PCs and workstations worked alone, generating reports and documents. They were widely viewed as word processors from the time Household International bought its first NBI workstations in 1983. Originally, they were not intended to be linked through local-area networks (LAN), with the exception of the tax department's IBM PCs, which are linked over an IBM Token-Ring LAN to access data from an IBM mainframe.

Perception changed

The perception of the NBI machines as word processing engines has changed drastically in recent months, says Office Systems Administrator Dina Norton. "We perceive NBI not as a vendor of dedicated word processing systems but as a total office automation systems provider," she says.

Users are being encouraged to make use of the NBI network, Norton said, but are not pushed into it. "If a user comes to us and wants access to NBI files, we support that on his workstation. But we don't go out and push them."

The 50 workstations are mostly used by the 180-member staff, many of whom are middle-level managers, secretaries and executive assistants.

Norton says that even with the changes in the system, few executives use the workstations and PCs. One thing changing some executive work patterns is the ability to do "what-if" analysis with Lotus Development Corp.'s 1-2-3, available to NBI workstation users from the System 66 file servers.

Word of mouth generally does what formal computer training sessions cannot, bringing more end users into the NBI system.

Management of the NBI systems is the responsibility of Geoff Young, director of corporate information systems for Household International, who acts as a systems administrator.

In-house expertise

In addition, there is a full-time systems analyst who is able to program in Microsoft Corp.'s MS-DOS and Unix. This in-house expertise allows Household International's systems management to be handled separately from the subsidiary corporations' MIS groups, which use IBM 3090 and 4381 mainframe systems in their production work.

NBI's philosophy of adding new architectural elements while protecting users' investments in older equipment is the underlying theme at the Household International site, according to Gary Sobol, manager for systems engineering at NBI. So while some of the older NBI 4000 workstations are still in use, all the file servers were upgraded in January to up-to-date models on lease from NBI.

A significant new element in the NBI system is the addition of five NBI 510s this month. Run under an NBI-modified version of the University of California at Berkeley's Unix 4.2, the minicomputers will serve as the platform for the Unify Corp. Unify and the BRS Information Technologies BRS/Search data base management systems, both sold by NBI.

NBI's communications architecture, NBI Net, will allow information gathered from all the Household International workstations, including IBM PCs, to be stored in the central Unix DBMSs.

"Household has been a longtime user of our word processing and PC applications," Sobol says, "and they, like many of our other large customers, are finding their productivity is greatly increased by moving toward departmental computing."

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Portables

FROM PAGE 55

hand-held terminals market are $400 million, plus or minus $50 million. "However," Glass says, "the market, if you assume full saturation for all of the applications that are defined today, has an annual revenue potential of as much as $8.5 billion." An estimate of market potential founded on more realistic saturation figures, Glass says, is still between $4 billion and $4.5 billion.

One reason that the sales potential is so high for these units is because, as Jerry Short can attest, portable terminals are no longer limited to traditional work-at-home or retail uses. An increasing number of companies are finding them useful to track inventory or documents, enter orders or read utility meters. And five years down the road, Glass says, terminals will be commonly used in "warehousing, factory control and package tracking for freight forwarders."

The California Judicial Council purchased portables, Short says, "because we have the same problem as grocery-store chains and other large industrial and production operations — that is, gathering data to help track the status, aging and location of huge amounts of inventory at any given time. Their inventory is goods of one sort or another; ours is court cases. We figured if bar coding could do their job, it could also do ours."

That turned out to be a valid conclusion. Bar codes read by small, hand-held terminals — Telxon PTC-701s — manufactured by Telxon Corp. in Akron, Ohio, are indeed beginning to cut the California court system's overwhelming case-handling task down to size.

Courting micros

California has 300 courts, ranging from some of the smallest, least sophisticated to some of the largest and most complex in the country. Eventually, each of these courts will have a microcomputer installed, to which up to 3,000 data collection points throughout the court system will be able to transmit information.

"We felt we needed a mainframe application to handle this monumental task," Short says, "but installing CRTs at each of these 3,000 data collection sites simply wasn't feasible. The hand-held solution gives us economy, simplicity of use with very little training, complete portability, decentralization and an efficient way to capture data on a real-time basis at the point of origin."

All of this, plus speed of data entry using bar coding and an error rate of only one in three million scans, compared with a keyboard-entry error rate of about one in every 250 to 300 keystrokes, make the court system's use of portable terminals extremely productive.

Here's how the procedure works: A bar code label with the case number is affixed to the file jacket of a case when it is opened at the individual court. At each stage of a case, a clerk scans both the bar code on the file as well as appropriate codes on local hard-copy menus, and the Telxon unit automatically documents the action taken, the date and the time. In a criminal case, for example, codes are entered from the hard-copy list for arrest, advisement of rights, charges, plea, arraignment, trial dates, jury selection and so on, until final settlement of the case.

This data is transmitted daily through a direct-connect RS-232 interface to the microcomputers of the court or courts involved in each case. There, in turn, the statistics are compiled, massaged and error-checked and then forwarded automatically via a 9.6K bit/sec. modem to the California Judicial Council's personal computers in San Francisco, which is Short's bailiwick.

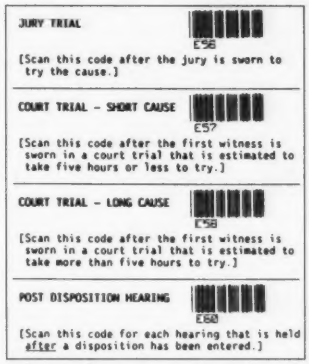
Making it easier

In addition to streamlining the collection of data, the Telxon application also greatly simplifies tracking of case files.

"Because of our staggering volume, files often got lost for weeks going through the system," Short says. "With bar codes, at any time during or after a trial, we'll be able to locate a file immediately and scan the bar code to ascertain a case's current status." This is achieved by scanning even more bar codes that may, for example, be on an employee badge or location card at the data collection point.

The California Judicial Council chose Telxon terminals after extensive product evaluations and a widespread bid process. "They weren't the lowest bidder," Short reports, "but they had the best price/performance ratio, as well as a history of providing excellent service and devoting resources to developing new applications."

To date, 40 courts in the system are connected to 700 Telxon-equipped data collection sites, with the remaining 260 courts scheduled to follow within 12 to 18 months. Short estimates that the total system will cost between $5 million and $6 million.


JURY TRIAL
E58
[Scan this code after the jury is sworn to try the cause.]
COURT TRIAL - SHORT CAUSE
E57
[Scan this code after the first witness is sworn in a court trial that is estimated to take five hours or less to try.]
COURT TRIAL - LONG CAUSE
E58
[Scan this code after the first witness is sworn in a court trial that is estimated to take more than five hours to try.]
POST DISPOSITION HEARING
E60
[Scan this code for each hearing that is held after a disposition has been entered.]

A bar code menu *used by the Superior Court of California.*

Hand-held takes the cake

Meanwhile, at Oakland, Calif.-based Mother's Cake & Cookie Co., life is sweeter these days for administrators and sales representatives, thanks to their new Route Commander — no, not a recently hired, benevolent boss, but another hand-held terminal — this one, the Model 121XL, a product of Norand Corp. in Cedar Rapids, Iowa.

According to George Ryerson, Mother's Cake & Cookie's director of information systems and communications, the Route Commander gives Mother's Cake & Cookie's sales and delivery personnel instant access to customer lists and any helpful information about each customer, inventory of their trucks, up-to-date prices on more than 80 products and information about daily promotional specials.

This last item alone is worth the price of the unit, Ryerson says. "We may have seven, eight or more products on promotion at any given time, and they change frequently. It's very easy for a salesperson to forget to mention one or more to his customers. But now, his hand-held unit reminds him and actually prompts him through each sale — sales he would have lost if he neglected to tell his customers about the current specials."

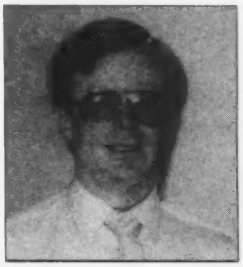
As sales representatives go through their routes, they enter data on each sale and return, so their sales and inventory records are always up to date. The Norand unit manages their cash, checks and expense items, including gas and oil, as well as monitoring mileage and keeping track of the date and route number.

In addition, it interfaces with the small 108P van-mounted Norand printer that the drivers keep in their trucks to create invoices, which they can deliver at the time of sale.

"This not only saves paperwork back at the office," Ryerson says, "but it helps avoid questions about possible errors, since the customer can check the invoice against his delivery immediately." Mother's Cake & Cookie has a disaster plan for manual invoice preparation, because the units do fail periodically. "But our failure rate is minimal," Ryerson reports.

Ryerson says the Route Commander's biggest advantage is the image of professionalism it provides to his company's sales representatives. "It imparts a certain 'automated trust,'" he says. "It's an intangible benefit, but an invaluable one." He adds that he prefers to calculate the company's savings since going from manual operations to the Norand unit in terms of efficiency, rather than in dollars.

"In the field, we've increased our sales without having to add additional salespeople, since each salesperson can now cover a wider route in the same amount of time," he says.



> "A HAND-HELD unit . . . prompts [a salesman] through sales he would have lost if he neglected to tell customers about current specials."
>
> GEORGE RYERSON
> MOTHER'S CAKE & COOKIE CO.

Mother's Cake & Cookie currently has 300 Norand units in the field, and Ryerson says it expects to install an additional 100 during the next year. Ryerson says Mother's Cake & Cookie started to use the units three years ago, after selecting Norand because it best matched the firm's requirements at the time.

"We're very pleased with it," Ryerson says, "and we're also somewhat committed to it because we invested a lot of money in our host software." However, because the company was uncomfortable about being completely dependent on one vendor, it has since developed modular software that can be used in other units if necessary at any future time.

Mother's manages communications with an IBM Series/1 and a high-speed link to an IBM System/38.

Meanwhile, Ryerson says he is planning to add functions that his Norand units can support right now, including a bar code capability, which will streamline field operations still further.

Take me home

Some of New York-based Metropolitan Life Insurance Co.'s programmers take their jobs home with them — literally. While this application of portable terminals does not involve field work or hand-held units, the portables' remote capabilities are certainly benefiting the way New York-based Metropolitan Life does business.

According to Robert Husnagel, director of investment systems and technology, programmers had been losing valuable time running jobs in the evening. Frequently, those jobs would stop, and there was no way to restart them until the next day. As Husnagel describes it, "We originally got involved with [portables] because we needed something for programmers to expedite jobs through the night.

"Say you run a batch job at 5 p.m., and for some reason it dies at 10 p.m. Instead of waiting until 8 a.m., you can dial in, fix it and run it, and you save a day. Add up enough of those days saved and you have a tremendous amount of productivity — just on that simplistic level," Husnagel says.

Good investment

Programmers in Metropolitan Life's investment systems and technology department take Informer Computer Terminals, Inc.'s Model 207 portable terminals home with them. The 14-lb portable has a 9-in. CRT display, which can show 24 lines of 80 characters each. The Model 207 emulates an IBM 3278 terminal and connects to IBM 3090 mainframes running VM through an internal modem. "You just take your modular telephone line and plug it in the back. It does have a memory of sorts, and you can program your password into it," Husnagel explains.

In order to determine whether his job is running, a programmer calls in to check its status. The VM system is set up with a combination of modems and software that functions as a security device. The system hangs up, checks his password and calls him back if it clears; then the programmer can work in a host session.

Metropolitan Life went the portable terminal route because it was inexpensive. "We had a bunch of programmers who could facilitate jobs and improve productivity very quickly just by turning sequentially based jobs around faster — by expediting at night. And we pick these [portables] up for $1,900," Husnagel explains. "So if you use a $1,900 piece of equipment to help a $40,000-a-year programmer, obviously it's worth it."

Husnagel is quick to point out that while it aids productivity, the portable terminal does not fulfill everybody's at-home work needs. "For a programmer, it's fine. For end users who do a lot of word processing, a PC-based [terminal] that emulates the 3278 on the PC side is probably a better tool."

Mula is a free-lance writer based in Waltham, Mass.

HARDWARE NOTES

Team claims superconductor breakthrough

A research team from **Bell Communications Research** (Bellcore) and **Rutgers University** recently claimed to have made an advance in creating thin superconducting films that could be used for future generations of computers.

The technology uses commercially available lasers and bulk superconductive compounds. The experiment involved a compound of yttrium, barium, copper and oxygen that has been used by other superconductor research teams. The Bellcore and Rutgers researchers mounted the material in a vacuum and fired laser shots at it to create a vapor that formed layers of material.

The researchers claimed the process is the least expensive method of making thin superconducting films. They said it allows a relatively inexpensive vacuum station to be put together for a higher level of control, as compared with using electron beams to do the same thing and that additional savings can be achieved by using more powerful lasers.

Boeing Commercial Airplane Co., a division of Boeing Co., has installed an **Alliant Computer Systems Corp.** FX/8 parallel processing minisupercomputer to help design its newest commercial passenger plane, the 7J7, targeted to replace planes in the class of Boeing's 727. The FX/8 will simulate real-time different elements of the 7J7's systems, including the autopilot, flight management and propulsion systems. Boeing chose the Alliant machine for its Unix compatibility and system expansion capabilities, according to Dilip Kumar, manager of the flight simulations laboratory at Boeing.

Digital Equipment Corp. has won a $114 million contract to supply the **U.S. Air Force** with computer systems for research and development work. DEC reportedly will supply the Air Force with VAX 8650 and Microvax II minicomputers and Microvax II/GPX workstations.

DEC is also getting into the library business through its System Cooperative Marketing Program. DEC has signed an agreement with **Data Research Associates, Inc.** in St. Louis, a supplier of turnkey computer systems for libraries that serves about 300 libraries in public, academic and corporate settings, DEC said. Data Research's integrated software system, Atlas, includes circulation, cataloging, acquisitions, materials booking, on-line public access, reserve books control, serials control, union lists of serials and other functions.

Tandem Computers, Inc. and Big Eight public accounting and management consulting firm **Coopers & Lybrand** have inked a pact under which the firms will implement on-line transaction processing applications for manufacturing.

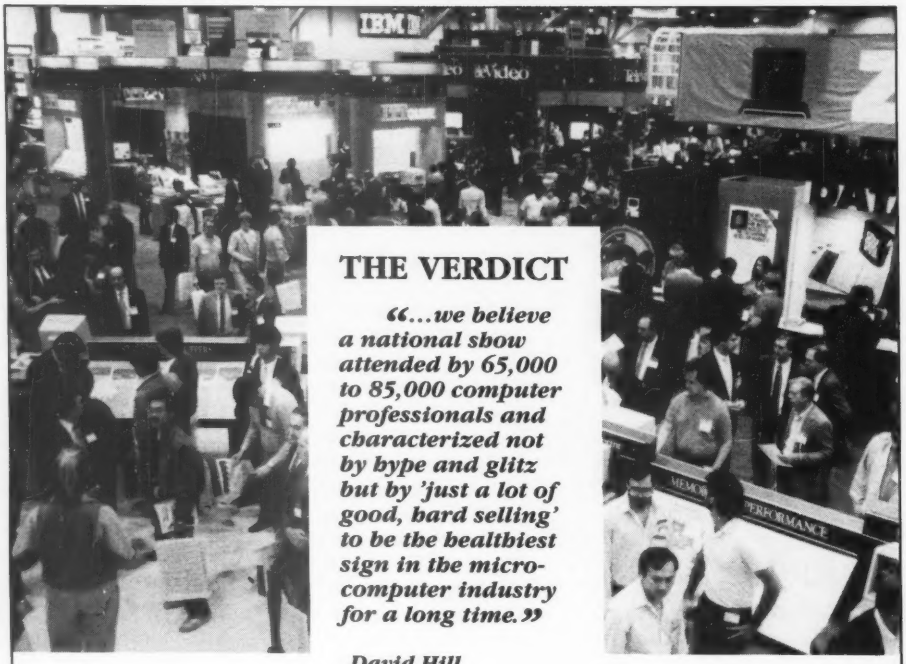
Coopers & Lybrand will provide project management, preinstallation analysis, post-installation implementation, training and support in all areas of manufacturing, with special emphasis in electronics, automotive, process and aerospace industries.

Tandem has also been selected as prime contractor by the **Royal Hong Kong Police Force** for a command and control computer system. Under the $15 million, 10-year contract, Tandem will supply a network of three Nonstop TXP systems with 19 CPUs and 500 workstations for regional command and control rooms, police stations and other offices. The first phase of the project is expected to go on-line by March 1989.

Britton Lee, Inc. has signed volume purchase agreements with **NCR Corp.** and **Metaphor Computer Systems** totaling more than $5 million, according to David Britton, president. NCR's Data Services Division will reportedly purchase $2 million worth of Britton Lee's relational data base management systems through 1988 to run with NCR 9800 mainframes in NCR's data centers of online financial services, which are used by more than 800 financial institutions in the U.S. Metaphor, an existing Britton Lee OEM, is set to incorporate an additional $3 million worth of Britton Lee subsystems with its graphic workstations.

Apollo Computer, Inc. and **Mentor Graphics Corp.** have signed a $100 million contract under which Mentor will use Apollo systems as hardware platforms for its Idea series of engineering workstations. The contract calls for Mentor to acquire Apollo products, including Domain Series 3000 Personal Workstations and DN570 Turbo graphic workstations. According to Apollo, it is the largest contract in that firm's history.

Stratus Computer, Inc. has received a multimillion dollar subcontract from **GTE Government Systems Corp.** The hardware vendor will reportedly supply up to $10 million worth of its fault-tolerant Continuous Processing Systems over the next 23 months, the company said. The deal is part of a $133 million contract GTE won from the U.S. Air Force to build an extensive communications system at the North American Aerospace Defense Command complex at Cheyenne Mountain in Colorado Springs.



THE VERDICT

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David Hill
Editor
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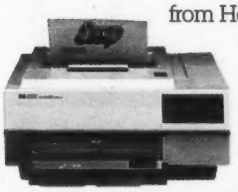

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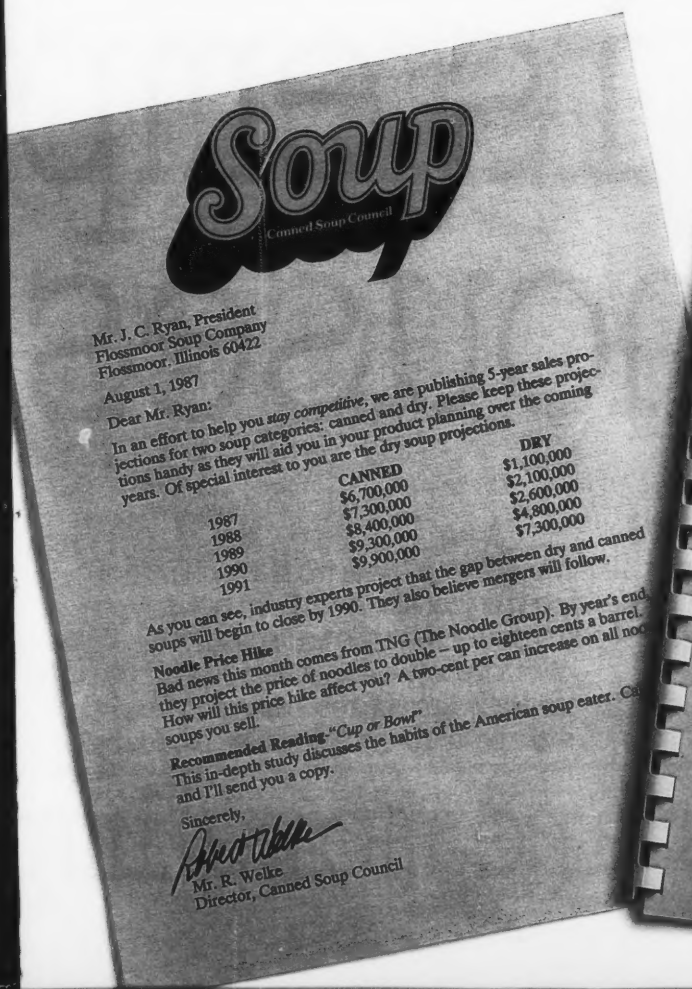

Soup

Canned Soup Council

Mr. J. C. Ryan, President
Flossmoor Soup Company
Flossmoor, Illinois 60422

August 1, 1987

Dear Mr. Ryan:

In an effort to help you *stay competitive*, we are publishing 5-year sales projections for two soup categories: canned and dry. Please keep these projections handy as they will aid you in your product planning over the coming years. Of special interest to you are the dry soup projections.

	CANNED	DRY
1987	$6,700,000	$1,100,000
1988	$7,300,000	$2,100,000
1989	$8,400,000	$2,600,000
1990	$9,300,000	$4,900,000
1991	$9,900,000	$7,300,000

As you can see, industry experts project that the gap between dry and canned soups will begin to close by 1990. They also believe mergers will follow.

Noodle Price Hike
Bad news this month comes from TNG (The Noodle Group). By year's end, they project the price of noodles to double – up to eighteen cents a barrel. How will this price hike affect you? A two-cent per can increase on all noo soups you sell.

Recommended Reading. *"Cup or Bowl"*
This in-depth study discusses the habits of the American soup eater. Ca and I'll send you a copy.

Sincerely,

Mr. R. Welke
Director, Canned Soup Council

NUTS

Deluxe Assortment **Spring 1987**

Peanut
A tasty, unique assortment from plantations in Africa and Southeast Asia. And, yes, from Georgia too!

Brazil Nut
Exclusively from South America, these Brazils are fat, hard-shelled and delicious. They'll be much in demand.

Hazelnut
Cakes, cookies, ice cream, chocolate, salads. They'll never taste better than with this delicious French variety.

Almond
They're popular and they're versatile. Available whole, sliced or chopped, they're equally at home in Mom's favorite recipes.

Pecan
Another great favorite in the bakery. And our own superb pecans will satisfy even the most discriminating Southern tastes.

Walnut
Blond English Walnuts are just one of the many varieties available in the best nutcracking tradition.

Chestnut
Superior varieties from our own plantations in Italy and France. All the best, for more than seasonal consumption.

Pistachio
With an unusually subtle and delicate flavor, these perennial favorites will be perfect for either sweet or savory dishes.

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warehouses

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portant than computers.

Users rate their mainframes

Survey Item \ Manufacturer and Model	Amdahl 580 Series	Honeywell DPS 7	Honeywell DPS 6	IBM 4361	IBM 4381	IBM 4300 Series, Other Models	IBM
No. of User Responses	29	40	38	185	335	28	
Average Life of System (months)	18.79	31.51	44.06	31.56	22.51	44.50	30
Acquisition Method (%)							
Purchase	65.52	72.50	52.63	65.41	45.67	42.86	48
Rental or Lease from Manufacturer	17.24	10.00	28.95	9.73	19.10	14.28	7
Lease from Third Party	17.24	17.50	18.42	24.86	33.43	42.86	42
System Ratings (4.0-1.0)							
Ease of Operation	3.62	3.59	3.32	3.13	3.22	3.04	
Reliability of Mainframe	3.72	3.72	3.55	3.78	3.84	3.50	
Reliability of Peripherals	3.34	3.35	3.03	3.48	3.47	3.21	
Manufacturer's Maintenance Service:							
Responsiveness	3.66	3.50	3.38	3.42	3.37	3.08	
Effectiveness	3.50	3.36	3.22	3.42	3.38	3.13	
Manufacturer's Technical Support:							
Troubleshooting	3.41	3.22	3.11	2.97	3.05	2.71	
Education	3.43	2.92	2.76	2.73	2.96	2.67	
Documentation	3.18	2.80	2.68	2.66	2.90	2.61	
Manufacturer's Software:							
Operating System	3.14	3.65	3.39	3.04	3.18	3.07	
Compilers & Assemblers	3.04	3.52	3.37	3.13	3.27	3.14	
Applications Programs	3.04	2.86	2.58	2.80	2.86	2.88	
Ease of Programming	2.85	3.45	3.05	2.91	2.92	2.61	
Ease of Conversion	2.86	3.37	2.76	2.62	2.76	2.52	
Overall Satisfaction	3.21	3.59	3.16	3.12	3.20	3.04	
Additional Ratings (4.0-1.0)							
Timeliness of Hardware Installation	3.72	3.54	3.53	3.39	3.54	3.23	
Timeliness of Software Installation	3.48	3.41	3.37	3.06	3.22	2.88	
Ease of Expansion	3.55	3.49	3.39	2.99	3.24	3.12	
Compatibility of Hardware Carried Over from Other Systems	3.48	3.28	3.00	3.05	3.25	2.83	
Compatibility of Programs/Data Carried Over from Other Systems	3.45	3.33	3.03	2.99	3.14	2.96	
Power/Energy Efficiency	3.24	3.38	3.06	3.04	3.23	2.85	
Productivity Aids Help Keep Programming Costs Low	2.71	3.11	2.51	2.61	2.67	2.46	
Software Support Delivered by Vendor	3.07	3.13	2.76	2.74	2.87	2.64	
Keeping Up with & Implementing Vendor Changes to Hardware/Software (Very Easy 4.0, Very Difficult 1.0)	3.19	3.25	3.05	2.66	2.78	2.81	
Did the system do what you expected it to do? (%)							
Yes	96.55	95.00	92.11	94.59	96.42	96.43	9
No	0.00	2.50	5.26	1.08	0.60	0.00	
Undecided	0.00	2.50	2.63	4.32	2.09	3.57	
Would you recommend system to another user? (%)							
Yes	96.55	87.50	81.58	88.11	95.22	96.43	9
No	0.00	7.50	7.89	4.86	0.90	0.00	
Undecided	0.00	5.00	10.53	5.41	2.39	3.57	

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IBM 308X Series	IBM 3090 Series	NAS All Models	NCR 8500/8600/8800	Unisys V Series	Unisys A 3/A 5	Unisys A 9/A 10	Unisys B 7900	Unisys A 15	Unisys 1100/60	Unisys 1100/70	Unisys 1100/90	Unisys Other	Other Mainframes
233	85	19	65	14	53	40	8	8	9	62	6	8	16
30.07	14.66	25.68	34.89	17.80	16.60	18.85	22.25	13.25	58.00	39.90	25.00	58.60	43.40
48.07	36.47	36.84	70.77	57.14	50.94	65.00	25.00	37.50	22.22	58.06	66.66	12.50	68.75
7.73	10.59	21.05	16.92	14.29	18.87	15.00	12.50	0.00	33.33	19.35	16.67	62.50	18.75
42.92	48.24	42.11	12.31	28.57	28.30	20.00	62.50	62.50	44.44	22.58	16.67	25.00	6.25
3.20	3.35	3.44	3.12	3.43	3.49	3.59	3.50	3.75	3.00	3.15	3.33	3.38	3.38
3.79	3.70	3.89	3.48	3.64	3.79	3.52	3.38	3.75	3.78	3.60	3.67	3.50	3.69
3.51	3.44	3.39	3.38	2.93	3.33	3.05	2.83	3.13	3.22	3.13	3.33	3.38	3.38
3.40	3.46	3.53	3.20	3.46	3.34	3.27	2.86	3.75	3.22	3.38	3.83	3.25	3.44
3.36	3.50	3.53	3.06	3.29	3.35	3.10	2.38	3.38	3.22	3.27	3.17	3.13	3.40
3.14	3.26	3.37	2.86	2.86	3.02	2.97	2.25	2.88	2.78	2.95	3.00	3.13	3.38
3.01	2.96	3.00	2.92	2.71	2.85	2.77	2.25	2.75	2.44	2.73	2.83	3.00	3.19
2.94	2.95	3.00	2.64	2.57	2.56	2.49	2.25	2.71	1.75	2.46	2.67	2.63	2.93
3.23	3.27	3.14	3.20	3.57	3.57	3.55	3.13	3.75	3.11	3.36	3.50	3.38	3.31
3.29	3.27	3.23	3.11	3.29	3.52	3.27	3.38	3.63	3.00	3.34	3.50	3.25	3.31
2.88	2.86	3.08	2.46	2.50	3.07	2.61	2.71	2.63	2.00	2.70	2.50	2.75	2.57
2.87	2.89	2.86	2.89	3.33	3.50	3.27	3.13	3.50	2.78	3.16	3.33	3.40	3.13
2.79	2.81	2.87	3.10	3.50	3.34	3.11	2.75	3.38	2.11	2.89	2.80	3.60	3.00
3.22	3.24	3.13	3.15	3.33	3.51	3.35	2.75	3.38	3.00	3.18	3.33	3.40	3.38
3.62	3.67	3.84	3.31	3.14	3.48	3.32	3.63	3.63	3.22	3.16	3.83	3.13	3.50
3.23	3.36	3.50	3.14	3.21	3.27	3.25	3.50	3.13	2.67	3.10	3.17	3.13	3.44
3.16	3.39	3.47	3.40	3.43	3.82	3.53	3.29	3.63	3.00	3.48	3.50	3.13	3.50
3.24	3.46	3.63	3.21	3.64	3.44	3.31	3.00	3.88	2.56	2.67	3.40	3.33	3.38
3.14	3.38	3.63	3.40	3.50	3.35	3.22	3.00	3.63	2.67	2.68	3.17	3.25	3.00
3.06	3.18	3.32	2.95	3.36	3.58	3.25	3.00	3.88	2.67	2.81	3.17	3.00	2.53
2.56	2.65	2.75	2.56	2.75	3.00	2.95	2.50	3.00	1.78	2.76	2.83	2.25	2.53
2.92	2.97	3.05	2.46	2.57	2.88	2.75	2.50	3.00	1.89	2.74	2.63	2.75	2.75
2.73	2.79	3.26	3.09	3.50	3.06	3.05	2.88	3.38	2.44	2.70	3.17	3.25	3.13
94.42	91.76	94.74	92.31	100.00	96.23	95.00	100.00	100.00	100.00	96.77	100.00	100.00	100.00
0.86	2.35	0.00	1.54	0.00	0.00	0.00	0.00	0.00	0.00	1.61	0.00	0.00	0.00
1.72	2.35	5.26	6.15	0.00	3.77	5.00	0.00	0.00	0.00	1.61	0.00	0.00	0.00
93.56	94.12	94.74	81.54	92.86	94.34	92.50	100.00	100.00	88.89	90.32	100.00	100.00	87.50
0.86	1.18	0.00	10.77	0.00	0.00	2.50	0.00	0.00	0.00	1.61	0.00	0.00	12.50
2.15	1.18	5.26	7.69	7.14	5.66	5.00	0.00	0.00	11.11	8.06	0.00	0.00	0.00

Top system

FROM PAGE 55

firm, said users rated 1,281 mainframes on questionnaires as part of the 14th annual Datapro user-satisfaction survey.

A five-year average of overall satisfaction scores showed Unisys on top at 3.239, followed by National Advanced Systems Corp. (NAS) at 3.205, Amdahl at 3.202, IBM at 3.169, Honeywell Bull at 3.14 and NCR Corp. at 3.077.

Datapro analyst Marilyn Courtney noted that the Honeywell Bull DPS 7 scored better this year than it had in the past, climbing from a 3.3 overall satisfaction rating to a 3.59 rating for the highest overall score among systems mentioned by 20 or more users. The DPS 7 also scored well in ease of operation (3.59), reliability of the mainframe (3.72) and operating system (3.65).

Honeywell Bull, with a leading corporate satisfaction score of 3.38, did not fair as well with its DPS 8, at 3.16, or DPS 88 and DPS 90 high-end machines, which received fewer than the minimum five responses needed for tabulation.

Amdahl scored well in areas such as ease of operation (3.62), reliability of the mainframe (3.72) and services such as maintenance, technical support, education and documentation. Amdahl also led the field in user recommendations; 97% of its users said they would recommend Amdahl systems to other users. NAS finished second in that category and scored well in other areas but fell short of the 20-response minimum for special mention and finished last in overall satisfaction at 3.13.

Unisys systems and the corporation as a whole posted the highest scores or tied for the highest in 17 categories, with the high-end A 15 mainframe, used by eight respondents, leading 10 of those categories. On the negative side, Unisys had the lowest scores in 21 areas, with the nine users of the Unisys 1100/60 and eight users of the Unisys B7900 combining to provide 18 low ratings.

Users of NCR equipment gave that company some of the lowest corporate ratings, including those for ease of operation, reliability of the mainframe and maintenance.

However, Courtney noted that the NCR systems rated were some of the company's older systems: the 8500, 8600 and 8800. The NCR 9800, introduced last year, was not mentioned by users.

The poorly rated Unisys 1100/60 was the oldest single system, with an average life of 58 months.

Trend in buying pattern

Datapro detected a trend in the pattern of system acquisition; only 52% of the respondents said they own their computers, compared with 54% in 1986 and 56% in 1985. The number of users leasing systems from the manufacturer inched upward from 14% to 15%, while 32% of the users said they lease systems from third parties.

Courtney also reported that main memories continued to increase in the mainframe market. The number of systems with more than 64M bytes of memory rose from 5% in 1986 to 7% this year. A total of 49% had at least 16M bytes of memory this year. Just three years ago, the majority of users had between 2M and 8M bytes of memory, and only 2% had more than 32M bytes.

Datapro also found the number of terminals connected to mainframes increasing, with 53% of the systems supporting more than 60 local terminals and 46% supporting more than 60 remote terminals. Last year,

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Datapro survey winners

Highest ranking systems

System	Overall satisfaction	Lowest score	Number of responses
Honeywell DPS 7	3.59	2.80	40
IBM 3090	3.24	2.81	85
Amdahl 580	3.21	2.85	29

INFORMATION PROVIDED BY DATAPRO RESEARCH CORP.

Special merit systems

Users rated these high in certain areas

Ease of operation	Weighted average	Number of responses
Amdahl 580	3.62	29
Honeywell DPS 7	3.59	40
Unisys A 9/A 10	3.59	40
Reliability of mainframe		
IBM 4381	3.84	335
IBM 3080 series	3.79	233

INFORMATION PROVIDED BY DATAPRO RESEARCH CORP.

Users rate their mainframe vendors

Survey Item \ Manufacturer and Model	Amdahl	Honeywell	IBM	NAS	NCR	Unisys	Other Mainframes
No. of User Responses	29	78	866	19	65	208	16
Average Life of System (months)	18.79	37.53	26.37	25.68	34.89	27.24	43.40
Acquisition Method (%)							
Purchase	65.52	62.82	49.54	36.84	70.77	52.40	68.75
Rental or Lease from Manufacturer	17.24	19.23	13.05	21.05	16.92	19.23	18.75
Lease from Third Party	17.24	17.95	35.91	42.11	12.31	27.88	6.25
System Ratings (4.0-1.0)							
Ease of Operation	3.62	3.46	3.20	3.44	3.12	3.38	3.38
Reliability of Mainframe	3.72	3.64	3.79	3.89	3.48	3.64	3.69
Reliability of Peripherals	3.34	3.20	3.47	3.39	3.38	3.16	3.38
Manufacturer's Maintenance Service:							
Responsiveness	3.66	3.44	3.39	3.53	3.20	3.35	3.44
Effectiveness	3.50	3.29	3.39	3.53	3.06	3.22	3.40
Manufacturer's Technical Support:							
Troubleshooting	3.41	3.17	3.07	3.37	2.86	2.94	3.38
Education	3.43	2.85	2.91	3.00	2.92	2.75	3.19
Documentation	3.18	2.74	2.85	3.00	2.64	2.48	2.93
Manufacturer's Software:							
Operating System	3.14	3.53	3.17	3.14	3.20	3.46	3.31
Compilers & Assemblers	3.04	3.45	3.24	3.23	3.11	3.37	3.31
Applications Programs	3.04	2.72	2.86	3.08	2.46	2.72	2.57
Ease of Programming	2.85	3.26	2.89	2.86	2.89	3.29	3.13
Ease of Conversion	2.86	3.07	2.73	2.87	3.10	3.08	3.00
Overall Satisfaction	3.21	3.38	3.19	3.13	3.15	3.30	3.38
Additional Ratings (4.0-1.0)							
Timeliness of Hardware Installation	3.72	3.53	3.53	3.84	3.31	3.33	3.50
Timeliness of Software Installation	3.48	3.39	3.19	3.50	3.14	3.18	3.44
Ease of Expansion	3.55	3.44	3.17	3.47	3.40	3.53	3.50
Compatibility of Hardware Carried Over from Other Systems	3.48	3.14	3.21	3.63	3.21	3.17	3.38
Compatibility of Programs/Data Carried Over from Other Systems	3.45	3.18	3.13	3.63	3.40	3.10	3.00
Power/Energy Efficiency	3.24	3.23	3.12	3.32	2.95	3.19	2.53
Productivity Aids Help Keep Programming Costs Low	2.71	2.81	2.62	2.75	2.56	2.79	2.53
Software Support Delivered by Vendor	3.07	2.95	2.86	3.05	2.46	2.73	2.75
Keeping Up with & Implementing Vendor Changes to Hardware/Software (Very Easy = 4.0; Very Difficult = 1.0)	3.19	3.16	2.75	3.26	3.09	2.97	3.13
Did the system do what you expected it to do? (%)							
Yes	96.55	93.59	95.03	94.74	92.31	97.12	100.00
No	0.00	3.85	0.92	0.00	1.54	0.48	0.00
Undecided	0.00	2.56	2.54	5.26	6.15	2.40	0.00
Would you recommend system to another user? (%)							
Yes	96.55	84.62	93.19	94.74	81.54	93.27	87.50
No	0.00	7.69	1.73	0.00	10.77	0.96	12.50
Undecided	0.00	7.69	2.89	5.26	7.69	5.77	0.00

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IBM CPU field

CONTINUED FROM PAGE 55

[IBM's] accounts, we believe IBM will have rough sledding," the report says.

The study surveyed 271 MIS executives managing IBM mainframe installations. Their companies were in the banking, finance, insurance and manufacturing industries. Firms were of all sizes, ranging from small businesses to Fortune 500 companies, in roughly equal proportions of small, medium and large firms.

Currently, DEC, with 16.7%, is the only non-IBM vendor with a significant presence in departmental systems. The companies that have DEC equipment in a department do not have IBM mid-range machines, too, the study found. However, when DEC equipment is present, it is generally found with other non-IBM processors, such as those from Wang Laboratories, Inc., Hewlett-Packard Co., Data General Corp., Tandem Computers, Inc. and Texas Instruments, Inc.

With the IBM 9370 departmental processor waiting in the wings, the stage is set for a showdown between the IBM 9370 and other minicomputers in the departmental arena. Gruhn predicted the 9370 will tend to retard DEC's progress as customers delay decisions in order to examine the new machines.

The study found that 32.4% of IBM accounts surveyed had no departmental systems but had a clear demand for them. As a result, the mid-range rivalry among companies seeking to sell to these accounts should continue for the next several years.

"I think IBM is going to do quite well with the 9370," Gruhn said. "IBM says 73% of 9370s are being targeted to new applications. If the 9370 does these jobs well, then DEC will have a fight on its hands," she added.

But the degree of the 9370's success will determine whether or not IBM can have its traditional clear majority market share in departments that it now has in other markets.

"We won't know if IBM can pull it off for six months," Gruhn said.

Top system

CONTINUED FROM PAGE 65

50% supported 60 local terminals, and 45% supported 60 remote users.

Datapro also noted that users continued an alternating pattern in connection with their expansion plans for this year. Expansion to current hardware configurations, indicated by 63% of users, surpassed expansion of data communications facilities, named by 62%, to head the list for 1987 acquisitions.

Software growth stunted

Communications expansion had moved ahead of hardware growth last year.

Sharp drops showed up in connection with software needs as acquisition plans for proprietary software slipped from 62% in 1986 to 55% this year. Acquisition of software from manufacturers fell from 53% to 50%.

However, one growth area was laser printer acquisition. Plans for those nonimpact printers were cited by 28% of the users this year and 26% last year, which was the first time they were included in the survey.

EMC ships VAX boards based on 1M-bit chip

HOPKINTON, Mass. — EMC Corp. recently claimed to be the first company to ship high-end Digital Equipment Corp. VAX memory boards using 1M-bit random-access memory (RAM) technology, with the delivery of its 16M-byte memory arrays at several customer sites.

EMC officials said the 1M-bit technology allows increased reliability and avoids the downtime associated with backplane changes.

The company said installation of the memory boards requires no modification of the VAX backplane.

EMC Senior Product Manager Kevin Fitzgerald claimed the 1M-bit technology allows use of boards narrower than those used in upgrades based on 256K-bit technology. He also claimed EMC upgrades cost 20% less than comparable DEC upgrades.

EMC's 16M-byte module costs $12,800. A 32M-byte upgrade costs $25,600.

Memory arrays for DEC VAXs

The firm also announced it has begun development of memory arrays for DEC's low-end VAX 8200, 8250, 8300 and 8350 computers.

The memory arrays will be among the first compatible-memory products that incorporate a VAXBI interface developed by an independent manufacturer, EMC said.

The memory array series will include 8M-, 16M- and 24M-byte boards, be fully compatible with the VAXBI architecture and use 1M-bit RAM technology, the vendor said.

EMC claimed its boards will run 20% faster than DEC memory boards. The EMC memory will deliver instructions and data from the CPU 2,300 nsec faster than DEC's memory, the vendor said.

The low-end 8000 series VAXBI memory arrays will be available this month, EMC said.

The better you understand the better your company c

The MIS perspective.

For years text management software has received scant attention from MIS.

Which is strange, considering how vital it is to some of the key people MIS has to serve.

Like the CEO plotting global competitive strategy.

For planners, strategists, and senior marketing executives, text management systems have proved their value repeatedly in recent years—delivering powerful bottom-line benefits, and creating a wave of demand that's headed right for you.

How do you prepare for this demand? Several ways:

First, make sure you understand text management software—before your users do. (Hint: we're *not* talking word processing.)

Second, select a text management approach that combines the features *users* need to obtain information—with the features *you'll* need to maintain system integrity. Users need specialized text search and reporting facilities conventional DBMS's don't offer; you need a new level of system controls dedicated retrieval systems don't offer.

And third, start evaluating text management systems and vendors without delay. You can begin that evaluation today with a look at INQUIRE/Text—the most comprehensive, proven text management software system on the market.

Text management: It's not word processing. And it's not data management.

Traditional corporate information systems do a great job managing structured data. Unfortunately, the information most needed by decision-makers is often unstructured—embedded in the text of documents such as letters, reports, and contracts. Because this material has traditionally been beyond the reach of online systems, access to it has been slow, tedious, and error-prone. Word processors and office automation systems, for all their other merits, have been practically useless in making the actual information content of documents available online.

A text management system fills this void by providing highly sophisticated facilities for online index, search, and retrieval of information in stored documents. With a text management system, users can pinpoint specific pieces of information within vast volumes of text—instantly. And once they've found the information, they can edit, combine, and report it with complete flexibility.

Traditionally, the biggest text management users have been in industries that are subject to extensive regulation and/or frequent litigation. Now others are taking advantage of the systems' capabilities for a broad range of corporate information management tasks. And high on the list of these tasks is competitive intelligence gathering for senior management.

The result has been a dramatic improvement in the quality of information available to decision-makers. And a dramatic increase in pressure on MIS to deliver text management capability.

INQUIRE/Text: The features users need. The control you need.

As the demand for text management capability has grown, so has the number of vendors claiming to provide it. But few of these vendors offer the features, the flexibility, and the track record of Infodata's INQUIRE/Text.

INQUIRE/Text's automatic indexing and powerful keyword search and retrieval facilities have set industry standards in text management for years. And INQUIRE/Text's capacity, ease of use, and flexible interfacing options have made it a hit not only with end users, but also the MIS personnel charged with implementing it. Finally, INQUIRE/Text's worldwide track record makes it comfortable for top management.

INQUIRE/Text. It's the first thing you need to know about text management. And the only text management software system you'll want to live with. ◆

INQUIRE/Text runs on IBM and compatible mainframes under MVS/TSO, MVS/CICS and VM/CMS.

Genicom obtains marketing rights to PDL

Plans to incorporate ACE technology in line of printers, OEM products

BY PETER BARTOLIK
CW STAFF

ATLANTA — Although the desktop publishing market is rapidly coalescing around a page-description language (PDL) standard, Genicom Corp. is betting that a broader market will embrace an alternate PDL.

The printer manufacturer announced during Comdex/Spring '87 that it has obtained the marketing rights to raster image processing technology and the ACE PDL from Chelgraph Ltd. in England.

Genicom said it intends to announce printers and OEM products containing the technologies by this fall and begin to ship products in early 1988.

Heading toward faster output

Adobe Systems, Inc.'s Postscript PDL has gained widespread endorsement among vendors of desktop publishing products, but Genicom officials said the market will develop rapidly for a PDL that they claim is invisible to the user and will enable laser printers to output at a much faster rate.

According to Rob Auster, director of marketing for nonimpact technologies with Genicom, ACE was designed to automatically convert to printer output the page layouts designed within end-user applications, whereas Postscript was designed to build a layout outside of the application.

During a demonstration held outside the Comdex show, Auster demonstrated the output of several dozen graphics, many of which were complicated, and none of which required more than a few seconds to execute.

Auster claimed increased demand for faster output laser machines is a result of the time lag required by printers to output complicated graphics.

"When you have 8 page/min. printers that really print at 8 page/min., there is not as much demand for faster printers," he said.

Genicom obtained the technology rights for plain paper products, while Chelgraph retained the rights for the linotype market.

Apply to printer products

Genicom said it will use the technology in a full line of printer products and will make it available to OEM firms on a board basis or through license.

The company is writing drivers for certain Microsoft Corp. products, including Windows; the Apple Computer, Inc. Macintosh line; Digital Research, Inc.'s GEM products; as well as Unix and mainframe applications.

While he said he expects Postscript to retain the loyalty of graphics artists who create their own layouts, Auster said Genicom expects a broad market acceptance of an alternative that allows users to simply use the layout capabilities of their applications and obtain almost instantaneous output.

Auster said the Genicom products will be priced from 20% and 40% lower than printers using Postscript and claimed they will provide from two to 10 times greater productivity.

text management software, an handle the competition.

The corporate strategist's perspective.

The amount of information that must be factored into major corporate decisions is increasing every day. And few categories of information are as sensitive or time-critical as competitive intelligence.

Whatever its source, whatever its nature, competitive information can be vital one day—and virtually worthless the next. To be used successfully in the timing and execution of any new initiative, competitive intelligence must be both accurate and actionable—and available to you ahead of your competition. And there's no better way to turn raw information into actionable intelligence than through a centralized online system under INQUIRE/Text.

INQUIRE/Text: Making the most of both internal and external information.

Competitive information comes from many internal and external sources: correspondence and memos, articles in trade journals, press releases, financial reports. Assimilating this information and making sense of it in time to act requires sophisticated text management capability. And INQUIRE/Text provides that capability in a proven, cost-effective manner that meets the needs of corporate strategists as well as MIS.

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No wonder hundreds of companies are already using INQUIRE/Text to make the most of their opportunities. No wonder we're convinced it will work for you, too.

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High-speed race

CONTINUED FROM PAGE 55

make it appear that use of superconductors to replace the silicon circuits in computers is as realistic as interstellar travel. But the appearance of usable superconductor circuits could occur within three years, according to industry observers, if progress continues as quickly as indicated by the claims made by researchers at IBM and their rivals in organizations such as Bell Communications Research (Bellcore), Rutgers University, AT&T, Argonne National Laboratory and Oak Ridge National Laboratory.

It should be noted that the first circuits are likely to be special-purpose circuits — designed to reduce key bottlenecks — that can be isolated and supercooled to support the high-speed switching that superconductors are intended to provide. Also, it is unlikely anyone will want to build an entire supercooled, superconductor-based computer, at least for MIS or other general-purpose applications.

In addition, it should be remembered that plenty of roadblocks remain for the researchers. For example, most of the recent announcements — such as the claim by Bellcore and Rutgers that they have used commercial lasers to construct thin-film superconductors — are focused on making, not using, superconductors.

But there is enough happening in the field to justify MIS managers taking note and recognizing that a new technology could have an impact on their jobs within a few years, or at least within the next decade, which isn't a long time in career terms.

Connolly is *Computerworld*'s senior editor, systems & peripherals.

NEW PRODUCTS

Processors

Autoscan32, a family of single-slot I/O controllers supporting Multibus I and VMEbus system expansion, has been announced by **Ariel Systems, Inc.**

Autoscan32 features a 24-MHz microprocessor, support for up to 32 asynchronous channels, 64K bytes of random-access memory and up to 16K bytes of read-only memory. As a modular controller, it supports eight channels at 38.4K bit/sec., 16 channels at 19.2K bit/sec. and 24 or 32 channels at 9.6K bit/sec. Each channel may be independently configured.

The Autoscan32 for the Multibus I costs $3,595. For the VMEbus, the product costs $3,995.

Ariel Systems, Suite I, 8545 Arjons Drive, San Diego, Calif. 92126.

Data storage

The DQ686, a disk drive controller said to connect up to four disk drives to Q-bus computer systems using the enhanced small disk interface (ESDI), has been announced by **Distributed Logic Corp.**

The quad-height controller interfaces up to four 5¼-in. ESDI Winchester disk drives with data transfer rates of up to 1.9M byte/sec., the vendor said. Support for the ESDI interface standard includes support of parameter-passing commands and use of disk drive manufacturers' flaw maps during drive formatting. It is also compatible with mass storage communications protocol drivers.

Features include a command-queue buffer, a 28-sector data buffer and support for 16-, 18- and 22-bit Q-bus addressing.

The DQ686 costs $1,650.

Distributed Logic, P.O. Box 6270, 1555 S. Sinclair St., Anaheim, Calif. 92806.

The **Bubbl-Tec** division of PC/M, Inc. has announced a nonvolatile bubble-memory module for Digital Equipment Corp. microcomputers called the **QBH-11 Bubbl-Board**.

The half-height Q-bus printed-circuit board is said to provide 1M byte of mass storage. It consists of two 4M-byte bubble devices plus support circuitry and can be controlled by any of the vendor's standard Q-bus bubble memory controlers, all of which emulate standard DEC disk drives.

As many as 16 QBH-11 Bubbl-Boards can be operated in conjunction with one controller, providing up to 16M bytes of on-line storage capacity.

The QBH-11 is priced at $1,409 in quantities of 10.

Bubbl-Tec, 6805 Sierra Court, Dublin, Calif. 94568.

Terminals

The **9540 industrial bar code terminal** and the **9550 industrial bar code transaction manager** have been introduced by **Intermec Corp.**

Both products feature 32-char. LCD displays and use a 16-bit microprocessor. Both can be used with various scanning devices, according to the vendor. Standard interfaces include RS-232C and RS-422. Data can be transferred at 19.2K bit/sec.

The 9550 transaction manager offers Intermec's Interactive Reader Language programming language. It is said to allow the user to follow transaction sequences, collect and format data and transmit transactions to the host computer. Its memory is expandable to 64K bytes.

With display and wand powerpack, the 9540 costs $1,095; the 9550, $1,345.

Intermec, P.O. Box 360602, 4405 Russell Road, Lynnwood, Wash. 98046.

The **HG-6905BK**, a 19V, 20-in.-high line-rate color monitor with analog input has been announced by **Mitsubishi Electronics America, Inc.**'s computer peripherals division.

The monitor is said to feature a scan range from 40 to 67 kHz horizontally and 50 to 75 kHz vertically. It offers a 1,280- by 1,024-pixel noninterlaced-resolution CRT with a self-convergence in-line gun, 0.31 mm dot pitch and a 90-degree deflection angle.

The HG-6905BK is priced at $3,750.

Mitsubishi Electronics America, 991 Knox St., Torrance, Calif. 90502.

Printers/Plotters

Zvert Corp. has unveiled the **Emushare-860**, a dual-channel emulator designed to connect up to two Xerox Corp. Model 860 word processors to the Xerox Model 4045 laser printer.

The Emushare-860 comes with two ports that are said to match the proprietary interface characteristics of the 860 word processor.

It supports the features of the Xerox 860, including bolding, super and subscripting, forward and reverse indexing, variable-line spacing, overstriking, underlining, justification and decimal alignment.

The Emushare-860 is priced at $970. A ZIO upgrade, said to increase the 860 word processor's print speed from 40 to 400 char./sec., costs $420.

Zvert, 15234 Transistor Lane, Huntington Beach, Calif. 92649.

Calcomp has announced price reductions for its **5800 series** color electrostatic plotting systems.

Models 5825, 5835 and 5845, which accommodate media widths of 24, 36 and 44 inches, respectively, now cost $49,000, $59,000 and $69,000, respectively. The 5800 series offers standard-vector memory of 12M bytes, with 25M-, 50M-, 140M- and 280M-byte disks available, the vendor said.

Calcomp, 2411 W. La Palma Ave., Anaheim, Calif. 92801.

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What did IBM buy for $22 billion?

An investment in manufacturing yields robots, mobots and a few idle production lines

BY MICHAEL SULLIVAN-TRAINOR

A self-powered car operating on an overhead monorail quietly delivers circuit-board panels to a transfer station in IBM's Lexington, Ky., plant. The arrival of the circuit boards activates the station, which moves the boards through the queue to one of 51 waiting assembly machines.

The process is controlled by IBM Series/1 computers — local controllers at the machine level and a large, fully configured "module master" overseeing the entire board line. Unless something goes wrong, the line operates almost completely without human intervention, producing 50 different types of logic cards for personal computers, printers and typewriters.

Meanwhile, on the factory floor below, robots, inserters and wave-solder machines surround a surface-mount machine. Using the new surface-mount technology, which incorporates a proprietary IBM design, IBM creates double-sided boards for the Personal System/2 that increase circuit density by as much as one-third to one-half of that of traditional pin-insertion boards. More circuits take up less space when installed this way in the PS/2, and signals travel more quickly between components.

During the past five years, IBM invested more than $22 billion in its 39 plants, equipment and property — $350 million to upgrade the Lexington facility alone. The investment is equivalent to 80% of Digital Equipment Corp.'s total revenue for the same period.

But what did IBM buy for $22 billion?

A long-term strategy

"IBM has developed a competitive edge in manufacturing," says Stephen Rosenthal, professor of operations management at Boston University.

"They have a very long-term perspective that certainly requires having a lot of internal resources to invest," Rosenthal continues. "But a lot of companies that have the resources are not investing as much in manufacturing as IBM is, and I think, over the long haul, it's going to be a valuable tool for IBM."

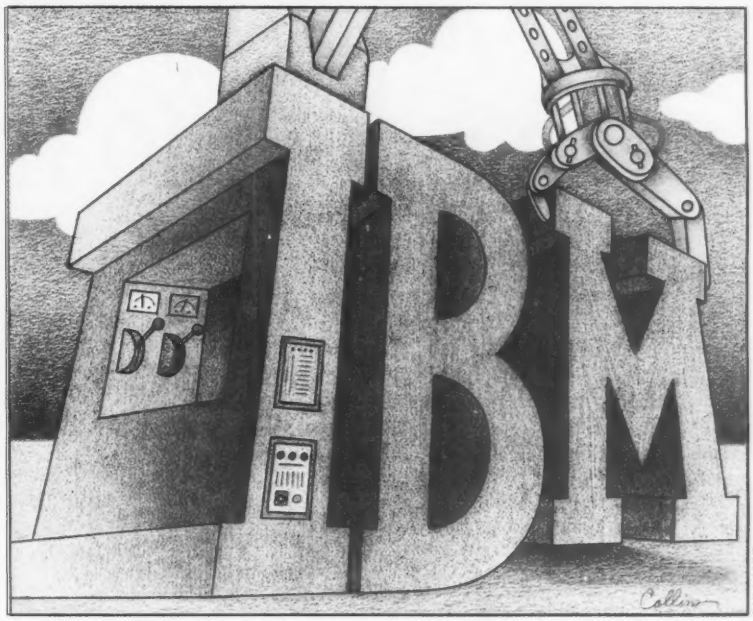
IBM invests so much money in manufacturing because it must meet a complex set of requirements to stay competitive in the market, according to Heinz Fridrich, IBM's director of manufacturing.

First, IBM's goal is to be the technology leader, producing innovative, proprietary products. The lion's share of the investment is devoted to developing its manufacturing techniques to meet product requirements.

A second goal of the company is to be the low-cost producer of products within each of the many markets it pursues. Five percent to 10% of the manufacturing investment is devoted to improving productivity through automation, Fridrich says.

Frequently, the first goal conflicts with the second because it requires spending more money, while the second goal focuses on saving money. Despite IBM's desire to be the low-cost producer, its manufacturing arm has little choice but to invest in expensive tools to build products. "You need investments in new technologies so that you can do your development. That's what really drives investment," Fridrich says.

As a result, Fridrich's managers try to save money in other



DAN COLLINS

Sullivan-Trainor is a *Computerworld* senior writer. (Photos courtesy of IBM.)

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ways. A prime example is their philosophy of Continuous Flow Manufacturing (CFM), IBM's version of the Japanese Just-In-Time concept, which requires workers to maintain a continuous flow of products on the lines, greatly reducing work in process and inventory and, at the same time, speeding production.

IBM's manufacturing managers must also be able to respond quickly to product demand. During the last five years, these managers geared their plants to produce high volumes in order to meet market forecasts. Today, the forecasts have proven to be overly optimistic, and many plants are not utilized to their maximum capacity.

To deal with capacity problems, IBM practices work-load balancing, shifting products between plants. Such a strategy requires a great deal of flexibility. Investments in automation — particularly programmable robotics — make this balancing act possible.

Another way IBM meets its manufacturing goals is to rely heavily on in-house production. Cost, quality and proprietary technology are easier to control when the participation of outside vendors is kept to a minimum.

Heinz Fridrich

"If it's a standard chip, and there's no proprietary advantage in making it inside, IBM usually won't," independent consultant Ulric Weil says. "But if it's specialized, they'll make it themselves. They are more willing to put money on the table to build in-house, even if they could get just as good a component on the outside," he says.

To further support the capability of developing products in-house, IBM uses a portion of its manufacturing resources to educate managers in new processes that give IBM a market edge.

"We teach things that are not generally known — techniques for measurement, surface preparation, a whole range of process capabilities," says Sam Korin, director of IBM's Manufacturing Technical Education Center in Thornwood, N.Y. (see story page 80).

At the high end

The crown jewels of the IBM manufacturing empire rest in the heart of New York's Hudson River Valley, where seven plants make everything from semiconductors to printers. A short distance from the Armonk, N.Y., corporate headquarters and the Thornwood education center, three of IBM's most sophisticated facilities employ some 30,000 people to build the company's high-end machines — 3090s, 3080s and 4381s.

EMPHASIS on quality extends to the most basic level — silicon crystals. Crystal ingots are pulled from molten silicon, which is melted at temperatures approaching one-quarter the heat on the surface of the sun.

From its birth at chip level in East Fishkill, N.Y., to its assembly and testing in Poughkeepsie and Kingston, N.Y., the main components of the 3090 system travel fewer than 30 miles between plants before they are shipped to the customer.

To assemble these components, other parts are required from IBM plants in Endicott and Brooklyn, N.Y.; Burlington, Vt.; Austin, Texas; Tucson, Ariz.; San Jose, Calif.; Raleigh and Charlotte, N.C.; Montpellier, France; Hannover, West Germany; and Yasu, Japan.

Advanced manufacturing processes are the hallmark of the 3090's development. Because complex, proprietary processes are required and because of IBM's desire to ensure top quality and reliability, great pains are taken to develop most of the components within the corporation.

This emphasis on quality extends to the most basic level — silicon crystals produced in East Fishkill. Crystal ingots are painstakingly pulled from molten silicon, which is melted at temperatures approaching one-quarter the heat on the surface of the sun. The ingots are smoothed into cylinders and then sliced to form wafers. Logic and memory chips are eventually diced from the wafers.

To accelerate chip production, IBM uses "master-slice technology," which requires a predefined circuit pattern to be repeated on silicon wafers. Many arrays of identical circuit-element cells are produced as a result, allowing designers to add new circuitry to customize chip variations.

Designers trace intricate circuit

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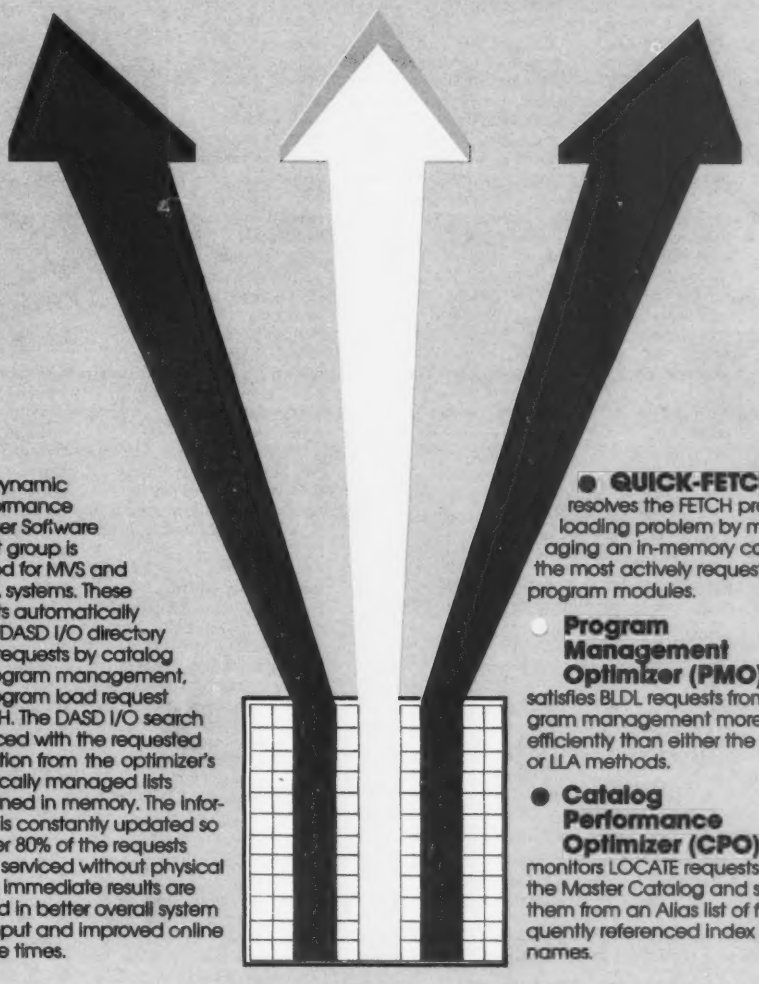

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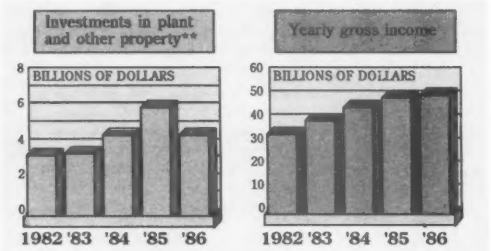
IBM spares no expense

IBM has spent approximately 10% of its total revenue – more than $22 billion – during the last five years on land, buildings, machinery and equipment, with the majority of the investment going to manufacturing improvements



**Category includes expenditures for nonmanufacturing property

INFORMATION PROVIDED BY IBM
CW CHART: SUSAN ALDAM

patterns using either IBM-designed electron-beam lithographic or standard photolithographic machines. Most other semiconductor manufacturers use the photolithography method, in which optical light interacts with chemical film to generate a pattern.

But the faster electron-beam lithography uses narrow beams of electrons to interact with the film. IBM's machines can interconnect circuits on up to 2,000 chips per hour.

In addition to the chips, the East Fishkill plant manufactures substrates — chip carriers that are at the core of the 3090's thermal conduction modules. Containing up to 36 ceramic layers and more than 130 meters of integrated wiring, the substrates are made from a ceramic slurry. IBM mixes the slurry from raw materials and water in a giant vat. Eventually, it is oven-dried and cut into 185mm sheets, which are stacked to form the substrate. Each sheet contains wires that, laid one on top of the next in the stack, form the circuitry that interconnects the chips.

Complex redesign

To accomplish these processes, IBM redesigned the East Fishkill plant, completing a 153,000-sq-ft test facility in 1984 and a new semiconductor building in 1985. Among the more elaborate measures in the plant design are actions taken to control contamination and dust. Class 100 air is pumped continuously through the chip-fabrication rooms. To prevent vibration, manufacturing is restricted to the middle floor of the plant, which is supported independently of the top and bottom floors. Those floors house the air-flow equipment.

Both the increased cost of equipment and the complexity of the technology make semiconductor manufacturing one of the most expensive processes at IBM.

"Thirty years ago when we built 1,000 wafers, it cost $3 million to $4 million," Fridrich says. "Now, for 1,000 wafers, the tooling alone is probably a couple of hundred million. We've increased from decade to decade by almost an order of magnitude."

For example, a photolithography tool years ago created patterns at a width of five microns, Fridrich says. Today, because of a technological breakthrough by IBM, the tool works in half-a-micron line width to achieve the density of current semiconductors.

"Each time you change the width, you need a different machine," Fridrich declares. "Years ago the tool cost $100,000. Today, you cannot even touch one under $1 million."

Such investments are necessary for IBM to stay competitive, Boston University's Rosenthal says. "In the good old days, IBM was in control of the industry, and they could pretty much control the pace and the direction of change. Now there are many more players, and the technology is shifting more rapidly. They have to be able to move at a faster pace."

New circuits are produced by the East Fishkill factory in 18 days, compared with at least six weeks' production time required by other semiconductor manufacturers.

Hosts order parts

After they leave East Fishkill, the chips and substrates are sent to Poughkeepsie where they are housed in thermal conduction modules (TCM). The modules are mounted on raw TCM boards constructed in Endicott. First introduced as part of IBM's 3081, the TCMs are used to cool the mainframe's logic and array circuits.

A data system based on two 3090 hosts and several Series/1s controls the assembly and test of Poughkeepsie's entire TCM operation. When an order is received from sales, the data system checks the inventory, both on the production lines and in the warehouse. To meet the order's requirements, the system will automatically place an order with other IBM plants and outside suppliers, which send the needed materials along with numerical control data describing the history of each part.

Data about defects in each chip, substrate and board is made into a composite with data from engineering laboratories regarding change orders for the modules. The data is communicated from the host to Series/1 systems, which run the tools that assemble and test the modules.

"The classic manufacturing problem is that you build a lot of units before the engineering change order takes hold," says Glen Allmendinger, president of Harbor Research, Inc., a Boston-based manufacturing consulting firm.

"By putting the orders online, IBM is distributing that data in a highly timely fashion. When an engineer finds something wrong with a product, the data system feeds the mistake back far faster than your average electronics manufacturer," Allmendinger says.

A floor control system, also run by the host data system, manages the flow of products through the lines by maintaining a sort of inventory book that shows where all the parts are and what stations are available. For example, an operator may find defects in a module and input the data into a Series/1 controlling the inspection process. The Series/1 will then query the host as to where to send the board. The host will communicate a series of steps that the Series/1 must follow to route the board to the proper rework station without operator intervention.

Another function of the host systems is to maintain a data bank of what is happening on the lines so that operators and managers can trace trends and monitor production.

By the numbers

On the bottom floor of Building 004 at the sprawling Poughkeepsie site, the data system begins assembly of the TCMs. Chip sets from East Fishkill are placed in bins according to order numbers. An operator activates an automatic "picker" that selects chips from the inventory bins to create a specified strip of chips to build a particular module.

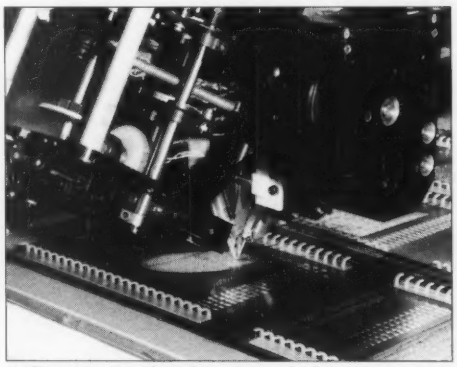
The substrates are mapped using a tool specially designed for the purpose. The mapper controls the placement of engineering change orders and sets the unique features of the chip sites. As the modules go through subsequent operations, the Series/1s on the line refer back to the data recorded by the mapper to determine the correct location of the chips for each module.

Following mapping, a Series/1-guided laser modifies the substrate chip pads by deleting connections to accommodate defects and engineering changes.

The chips are aligned and placed on the substrates by a tool that works from a computerized image of the chips and integrates that with an image of the substrate surface. The machine stops at every 10th chip to allow an operator sitting at a terminal to check its work.

Prior to the installation of the IBM-designed automatic alignment machine Alcorn, operators used a joystick to align the chips while the machine performed the placement. The Alcorn works at a greater speed and with more accuracy than an operator.

After the chips are placed, they are bonded to the substrate with solder in a reflow furnace that makes all the connections — more than 100 per 3090 module — simultaneously.



A discrete auto bonder *ultrasonically connects copper wires on a 3090 thermal conduction module board.*

Wire bonding between the chip pads is done ultrasonically with copper wire using a discrete auto bonder (DAB), which resembles a sewing machine when it operates. During the process, the high-frequency ultrasonic vibration buries the gold plate of the wire into the gold plate of the chip pad. The DAB obtains the bonding coordinates from a Series/1. Operators are stationed at the machines to watch for defects in the process.

IBM continues to use ultrasonic bonding — a mid-1970s technology — rather than a faster technique of microwelding used by other manufacturers, because there is no way to control the temperature changes in the chip pads at different levels of the substrate, says Frank DeTurris, manager of the TCM board line. Unpredictable changes in temperature can affect the reliability of the chip connections. The major test in the process is performed by the Poughkeepsie Accelerated Run-In System, or PARIS, which subjects the modules to varying power and temperature cycles to drive the chips to fail in the equivalent of six hours of operation. Any failures are sent to

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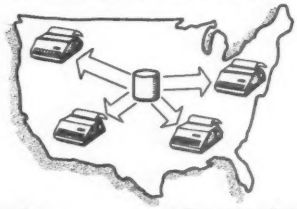

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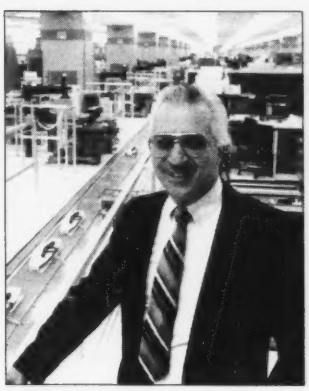
the East Fishkill plant by the host, and the reason for the problem is investigated.

When vistors tour the Poughkeepsie plant, they are taken to Building 012, where the TCMs are mounted on boards in an automated production line. While the entire operation is computer controlled, there are certain key areas in which IBM found there are things people can do better than automated devices.

At the beginning of the line, a robot stands idle in the center of a room filled with manned workstations. There, operators insert 20,000 C-springs — in strips of 1,000 — into each TCM board with a sharp click. The springs connect the TCM modules to the boards.

"We did attempt a robotic program on this, but we couldn't imitate the operators' hand-eye coordination," DeTurris says.

When IBM first considered automating the line, it took an operator eight hours to complete the insertions. Now, because of efficiencies that reduced the amount of work in process, the operator takes less than four hours to finish the job.



"THE 3090 module and advanced board lines are pretty much exclusively built in-house because of the technology."

FRANK DETURRIS
IBM POUGHKEEPSIE

After the C-spring insertion, the boards go through a wave-solder machine that fills the C-spring holes with flux. The boards are then X-rayed and inspected by operators to make sure all the holes are filled.

Move merchandise

Prior to the installation of an automated board line in Poughkeepsie in 1985, the 3090 boards were built in separate areas, or "pockets of production," and operators wheeled them around on carts. Manual board handling required extra operators to be available — idle — to help move boards from station to station, because the boards exceed the weight limits set by safety standards for a single person to lift. It also resulted in a great deal of work in process — extra inventory from a manufacturer's point of view.

Now the boards travel on a track in self-propelled cars. Each board is stamped with a bar code, and bar code readers are stationed at spurs along the roller-bearing track so computers at various locations can determine which board is being sent to which station. The data collected by the bar code readers is communicated to the central data system.

IBM says it is proud of this materials-handling system. "We didn't save anything by putting the automated handling system in place in terms of overhead, because we created other jobs for operators to run machines on the line," DeTurris says. "But we did save 10- to 20-min. segments of an operator's job when they were looking for boards."

Kathy Corey, one of the operators who helped implement the board-handling system, now controls a sector where several operators work with the boards as they are delivered by the cars.

"Operators used to pick out the boards they felt it would be easier to work with, leaving other boards sit," she says. "Now we have control of distributing the work on a priority basis."

Assembly robots

In the final board assembly, robots install capacitors and bond them by using a hot gas tool to liquify the solder. Manual tools sit side-by-side with the robotic system — a reminder of the time when operators bonded eight capacitors at a time to the boards, resulting in a dozen categories of defects in the capacitors.

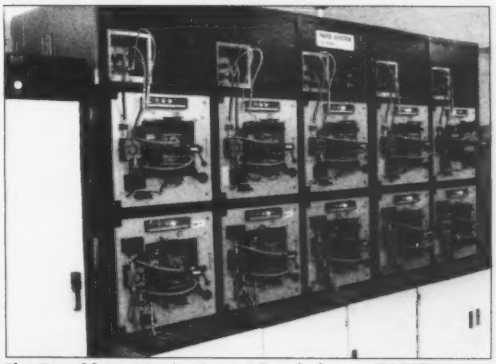
The robotic system, controlled by IBM's industrial personal computers, increased the speed of the process by only a small margin. But because of their predictability, the robots reduced the defect categories from 12 to two.

"It's easier to track down those two than the 10 or 12 that kept changing in the manual operation," DeTurris says.

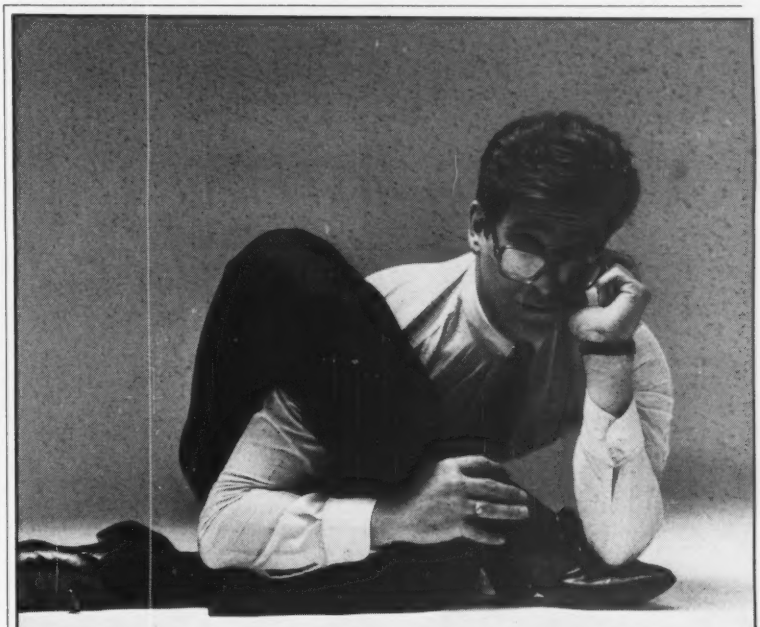
A Puma robot, bought from Westinghouse Corp., armed with a force-controlled sensor, is used to install terminating resistors on the boards. Operating with a self-correcting program, the robot will change locations up to five times to find the right force for seating the resistors.

When resistors were manually inserted, the operators would place all 700 of them in the proper locations. But most boards do not need all the resistors. In fact, many need less than 350, but there was no way for the operator to know exactly where each resistor belonged without following a different circuit map for each board. Now the robots insert the resistors only where they are needed, following a diagram transmitted by the Series/1.

After it leaves Poughkeepsie, a 3090 TCM board is placed in its frame and married with other components at the Kingston



The Poughkeepsie *Accelerated Run-In System (PARIS).*



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Workers seated *around the perimeter of a Class 100 clean tunnel assemble 5¼-in. hard disk units at IBM's Rochester, Minn., plant.*

plant. Because of the technology requirements of the 3090, IBM relies heavily on its in-house expertise. There are times, however, when outside vendors are called in to help out.

"The module and advanced board lines are pretty much exclusively built in-house because of the technology," DeTurris says. "But there are some standard cards that vendors supply. Most of it is driven by work-load buffer requirements. We can bring it in, and when we get work-load peaks, we can subcontract out to vendors."

Shuffling off to Charlotte

In addition to farming out work to vendors, IBM balances work loads within the corporation. Because the company maintains a full-employment policy, IBM will often move work from one plant to another plant that is experiencing low demand rather than lay off idle employees. For example, some of the circuit-board work done in Poughkeepsie is currently being transferred to the Charlotte, N.C., plant.

Currently, IBM is continuing to balance work loads as well as take more drastic measures because many of the plants are underutilized.

"To match the 50% growth in the plant and equipment budget over the last two years, they would need shipments rising 20% to 22% a year," says Jay Stevens of Dean Witter Reynolds, Inc. "In the last two years, that has not happened at IBM, so they clearly have excess capacity."

While IBM does not agree that overautomating is the cause of its troubles, the corporation is reducing expenses because of decreased demand. For example, more than 15,000 employees, mostly from manufacturing, have been transferred to other jobs within the company in the last two years.

> "THE plant is designed as a flexible system, so I can take the new product and put it on my line for very little capital. This is a first in IBM — making a major subassembly fit on another line."
>
> JOHN PECK
> IBM LEXINGTON

The corporation also took the extreme measure of closing a plant in Greencastle, Ind., and giving plants in Boulder, Colo., Hannover and Amsterdam new nonmanufacturing roles. These actions provide a sharp contrast with the practices followed prior to 1986, which are recorded in IBM's annual reports, when the corporation was constantly upgrading its plants

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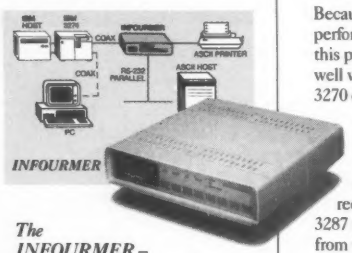

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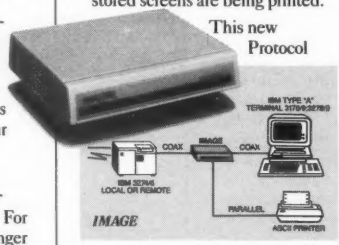

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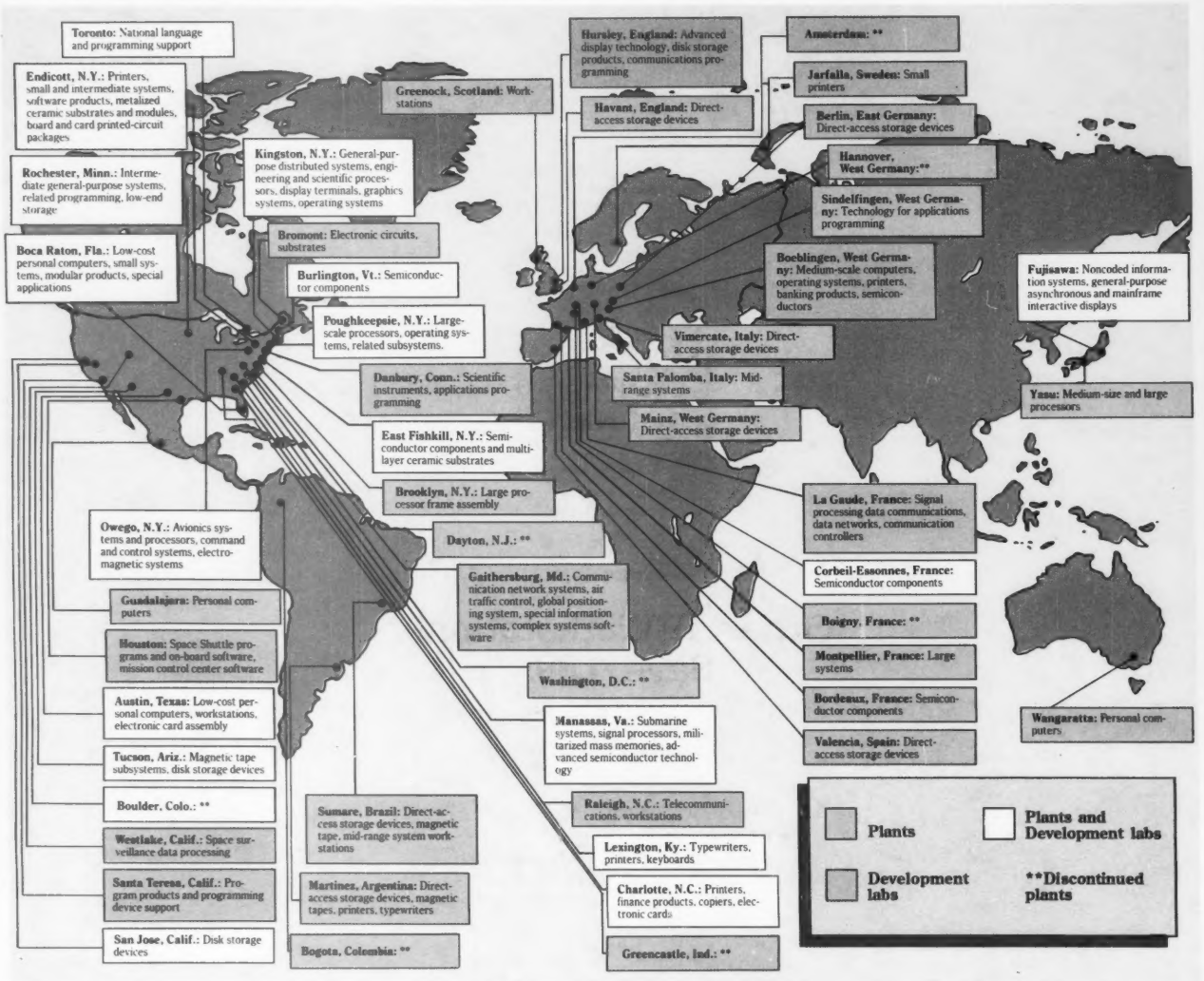
IBM's worldwide manufacturing empire

IBM's 35 manufacturing plants are located in many parts of the world to serve regional markets — development facilities are associated with most of the plants to link product design with manufacturing


Toronto: National language and programming support
Endicott, N.Y.: Printers, small and intermediate systems, software products, metalized ceramic substrates and modules, board and card printed-circuit packages
Rochester, Minn.: Intermediate general-purpose systems, related programming, low-end storage
Boca Raton, Fla.: Low-cost personal computers, small systems, modular products, special applications
Greenock, Scotland: Workstations
Kingston, N.Y.: General-purpose distributed systems, engineering and scientific processors, display terminals, graphics systems, operating systems
Bromont: Electronic circuits, substrates
Burlington, Vt.: Semiconductor components
Poughkeepsie, N.Y.: Large-scale processors, operating systems, related subsystems.
Danbury, Conn.: Scientific instruments, applications programming
East Fishkill, N.Y.: Semiconductor components and multilayer ceramic substrates
Brooklyn, N.Y.: Large processor frame assembly
Owego, N.Y.: Avionics systems and processors, command and control systems, electromagnetic systems
Dayton, N.J.: **
Guadalajara: Personal computers
Houston: Space Shuttle programs and on-board software, mission control center software
Austin, Texas: Low-cost personal computers, workstations, electronic card assembly
Tucson, Ariz.: Magnetic tape subsystems, disk storage devices
Boulder, Colo.: **
Westlake, Calif.: Space surveillance data processing
Santa Teresa, Calif.: Program products and programming device support
San Jose, Calif.: Disk storage devices
Gaithersburg, Md.: Communication network systems, air traffic control, global positioning system, special information systems, complex systems software
Washington, D.C.: **
Manassas, Va.: Submarine systems, signal processors, militarized mass memories, advanced semiconductor technology
Sumare, Brazil: Direct-access storage devices, magnetic tape, mid-range system workstations
Martinez, Argentina: Direct-access storage devices, magnetic tapes, printers, typewriters
Bogota, Colombia: **
Raleigh, N.C.: Telecommunications, workstations
Lexington, Ky.: Typewriters, printers, keyboards
Charlotte, N.C.: Printers, finance products, copiers, electronic cards
Greencastle, Ind.: **
Hursley, England: Advanced display technology, disk storage products, communications programming
Havant, England: Direct-access storage devices
Amsterdam: **
Jarfalla, Sweden: Small printers
Berlin, East Germany: Direct-access storage devices
Hannover, West Germany:**
Sindelfingen, West Germany: Technology for applications programming
Boeblingen, West Germany: Medium-scale computers, operating systems, printers, banking products, semiconductors
Vimercate, Italy: Direct-access storage devices
Santa Palomba, Italy: Mid-range systems
Mainz, West Germany: Direct-access storage devices
La Gaude, France: Signal processing data communications, data networks, communication controllers
Corbeil-Essonnes, France: Semiconductor components
Boigny, France: **
Montpellier, France: Large systems
Bordeaux, France: Semiconductor components
Valencia, Spain: Direct-access storage devices
Fujisawa: Noncoded information systems, general-purpose asynchronous and mainframe interactive displays
Yasu: Medium-size and large processors
Wangaratta: Personal computers
Plants
Plants and Development labs
Development labs
**Discontinued plants

and its equipment.

In 1984, additions were made to plants in East Fishkill; Poughkeepsie; Burlington; Charlotte; Endicott; Mainz, West Germany; and Vimercate, Italy. The $350 million investment in the Lexington plant was completed and an administration building constructed in Purchase, N.Y., where the worldwide manufacturing headquarters is now located.

In 1985, even though a record low in the per-unit cost of manufacturing was reported and selective actions taken to reduce expenditures, an additional $10.8 billion was invested in research, development, property and plants. At the time, more than five million square feet of new plant and laboratory space was added, and 4.8 million square feet of space was under construction. Included in these figures were the semiconductor building in East Fishkill and manufacturing buildings in Kingston; Rochester, Minn.; and Greenock, Scotland.

Then in 1986, the Greencastle closing was announced, workers were transferred, an early-retirement program was launched, and the Boulder plant was reassigned as a nonmanufacturing facility. This year, two other plants have joined Boulder in reassignment — reducing the number of plants to 35 — and the annual investment dropped back to 1984 levels.

"Only two years ago," Fridrich says, "you may recall [IBM CEO] John Akers was projecting that this industry would continue to grow at a rate of 15% or 18% or something like that, but in the last two years, we've had to revise our forecasts significantly.

"And of course, with the lead time in manufacturing, you put investments in place for 15% [growth], and if you only run at, let's say, 10%, you have too much infrastructure in your manufacturing organization, and you have to adjust. We try to reduce our resources, shift capacity and get into a balanced plan," he says.

In the opinion of many industry observers, IBM's faulty market forecast stems from decisions made before Akers' time. "The decision to expand by 50% between '84 and '86 was made years before that time period," Stevens says.

"The blame rests with top management," adds Steven Milunovich, research analyst for First Boston Corp., "and John Opel was there at the time. Akers came in at the wrong time. It's not his fault that they made the investment.

"If the volumes return, this overautomating will be a benefit," he says. "But there's a real question whether the growth rate will return to historical standards, so IBM may have this overhead problem for some time."

Twin giants

Milunovich makes an analogy between General Motors Corp., which is also known for its manufacturing automation, and IBM.

In the late '70s, both companies were the No. 1 manufacturers in their markets, and they both decided that low-cost manufacturing was the key to staying ahead of the competition, he says. GM, which invested in small cars with similar features, was hurt when oil prices came down and consumers wanted bigger cars with more functional features. Ford Motor Co. met the need and gained market share as a result.

"The same thing happened to IBM," Milunovich says. "They said, 'The competition is going to be AT&T and the Japanese.' So they spent a lot on property and plant, and they expanded volumes. Now here you are in the mid-'80s, and it turns out that AT&T is a paper tiger, and it's really DEC that's the problem. DEC doesn't sell on price, they sell on function."

Faced with this argument, IBM points to the efficiencies brought about by the corporation's investments in automation and the product innovations generated by new manufacturing processes. Yet even in these

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instances, capacity problems are evident.

"The Lexington plant is designed to make a million typewriters a year," Fridrich says. "We're underutilizing that investment.

"Obviously, we have some flexibility to reduce the design point," he continues. "But we have had some problems over the last two years. We did not have as much load as we would like."

As a result, Fridrich says, he decided to shift manufacturing of the Proprinter from Charlotte to Lexington to make up for excess capacity. Besides typewriters, Lexington manufactures a variety of printers, keyboards, circuit boards and supplies for other products.

"We never dreamed of running the Proprinter here," says John Peck, who manages final assembly in Lexington. "But the plant is designed as a flexible system, so I can take the new product and put it on my line for very little capital. This is a first in IBM — making a major subassembly fit on another line."

> "TO MATCH the 50% growth in the plant and equipment budget over the last two years, IBM would need shipments rising 20% to 22% a year. That has not happened, so they clearly have excess capacity."
>
> JAY STEVENS
> DEAN WITTER REYNOLDS, INC.

Even with the addition of a new product, the Lexington plant will have more capacity to accommodate additional work.

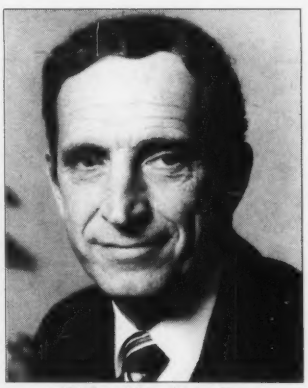
"Final assembly is pretty much a self-fulfilling prophesy," Peck says. "I will do what I have to to make the boxes that are coming at me. I don't tool up and have people standing there to build twice what I need. When I say I have more capacity, it means I have the potential of expanding my automation by making enhancements."

Behind this flexibility is a change in thinking that took place at Lexington — which began making IBM typewriters in 1956 — and led to the $350 million retooling of the plant.

"We've gone from a site that thought it was a typewriter manufacturer to one that is really making printers that just happen to have keyboards on them," says Dave Ellmann, one of the original design engineers for the retooling.

One of the driving forces behind Lexington's automation was the fact that IBM was losing market share to competing typewriter makers.

"If they hadn't built the manufacturing technology that they did in Lexington, they might as well have chosen not to compete in the typewriter business," Rosenthal says. "Instead, they designed and built a plant that would allow them to stay a leading manufacturer in that area."



Richard Daubenmire

The same formula was carried out at the Charlotte plant a few years later, when the Proprinter was developed. IBM was relying on Japan's Epson Corp. to make printers for the Personal Computer. Then IBM made a strategic decision to enter the market with its own product. In 1985, the Charlotte plant reduced printer production costs by using an automated line of 50 robots to produce printers with 90 fewer parts than previous products, which contained 150 parts. The Proprinter captured 18% of the market.

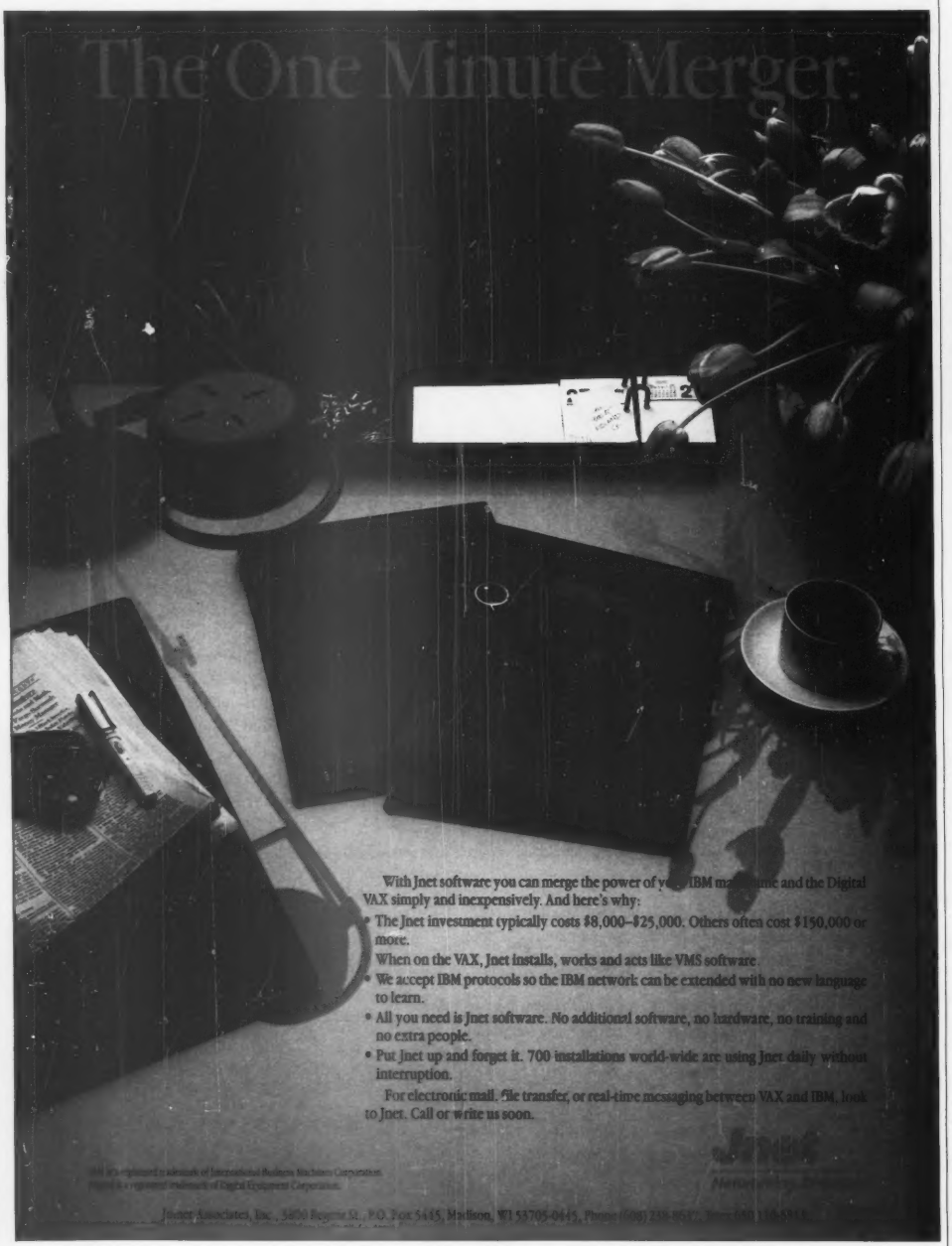
"IBM showed that if you really emulate the Japanese approach to manufacturing, which requires quite substantial funds, you can beat the Japanese at their own game," Weil says.

Quiet battlefield

Located in the heart of bluegrass country, IBM's 400-acre Lexington facility is surrounded by pastures dotted with grazing Kentucky Derby hopefuls. The location seems an unlikely place to make a stand against the Japanese.

In fact, rather than view its efforts as copying the Japanese, IBM regards the plant as the culmination of many homegrown concepts prevalent throughout the corporation. An example of this is the network of Series/1s and host systems that controls the lines in a manner similar to the Poughkeepsie data system.

Robotics and automated assembly lines have also been implemented wherever possible. Decisions about what processes to automate were facilitated by a software package first used in Poughkeepsie. The package was developed by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two MIT professors, Geoffrey Boothroyd and Peter Dewhurst. IBM contracted the two to develop a version of their Design for Assembly system for the PC for use in many of the plants.

Early Manufacturing Involvement (EMI), which brings manufacturing engineers into the product design process, is an early 1980s IBM concept that the Lexington facility put to work, reducing the number of parts required to build its products. EMI also led to designs for printers, typewriters and keyboards that have common subassemblies that are better suited for the manufacturing process.

Another progeny of Lexington's EMI project is a "flexible pallet," measuring 26 by 22 by 18 in. Any product that fits on the pallet can be made on the plant's assembly lines. Product designers stay within these limitations when creating new models.

The only truly Japanese approach used in the Lexington manufacturing process is Continuous Flow Manufacturing. "CFM was developed by a task force put together to find out why the Japanese were so damned good," Korin says. "They found that the Japanese were using a lot of concepts that IBM used many years ago and had forgotten because our focus had been on short-term results and a different management direction."

Since the task force developed the CFM concept in the early 1980s, all of IBM's plants have adopted it to a certain extent.

"It wasn't a mandate," says Richard Daubenmire, vice-president of manufacturing for IBM's Entry Systems Division. "But there was a desire on the part of the corporate manufacturing organization that said, 'Here is a technique that we think makes sense, and we'd like each manufacturing organization to evaluate this approach.' "

CFM focuses on cutting manufacturing costs by reducing the parts inventory to only the amount needed for current production. This strategy, in turn, cuts down on work in process and requires suppliers to deliver directly to the production line. Japanese-style Kanban queues are used throughout the process to control the number of parts that build up at different stages.

If the parts exceed the maximum Kanban limit — set by the engineers who designed the line — that is a signal to the operator and manager that a problem must be resolved on the line.

The difficulty with CFM is that it represents a cultural change for IBM, Daubenmire says. "If you're a materials bigot, you can go back a decade or so and point to a time when we thought that the right way to run a manufacturing facility was to have maximum work in process on the floor," he says.

"The theory said, 'You ought to be able to always see piles and piles of materials,' because that way you could assure yourself that you'd always be able to manufacture what you needed. We've gotten smarter both here and abroad, led by some other countries, such as the Japanese. We've quickly come to the conclusion that the materials theory is wrong. It not only created inventory, but it also slowed down the process," Daubenmire says.

As with Just-In-Time, CFM takes time to implement, and IBM is still in the midst of a public relations campaign within certain plants to push the concept.

Visible signs

At a board-inspection workstation in Poughkeepsie, a posted sign reads: "CFM wants you." A short distance away, a Kanban sign is hung beside another workstation where the numbers 35 and 43 are posted — representing the work-in-process limits for this particular line.

In Poughkeepsie, automation reduced work in process by a factor of two. CFM programs, like the one at the inspection operation, reduced it by another factor of two, DeTurris says.

At Lexington, a portion of the CFM concept — giving workers more skills and more responsibility — is evident in the creation of owner/operators.

"Rather than just putting screw No. 3 in hole No. 12, an owner/operator is responsible for the care and feeding of a set of machines," Ellmann says.

The owner/operators are responsible for the quality of the work their machines produce and for maintaining them.

Building in-house

In addition to automation, EMI and CFM, Lexington's production is driven by a desire to build most parts and products in-house. For example, more than 90% of the parts for the keyboards are made on-site.

"We decide whether to build our own components or buy them based on three factors — cost, quality and availability," Ellmann says. "If we can build more efficiently, then the manufacturing cost is lower. And there is no one easier to emphasize quality with than yourself."

When typewriters and printers began requiring more plastic parts than metal ones, Lexington switched its in-house expertise from machining tools to injection molding.

"We want to minimize how deeply we're involved in a supplier's shop," Peck says.

Unlike smaller companies, which have less pull with their suppliers, IBM can influence the practices of its outside vendors because of the volume of parts it requires. For example, in Lexington, the plant introduced a zero-defect program, which uses statistical measurements of defects in incoming parts to push suppliers to improve their quality. Five years ago, only 58% to 60% of the parts passed inspection. As a result of the zero-defect program, more than 90% of the parts are

Continued on page 81

What is Kanban?

Kanban is the Japanese word for a manufacturing philosophy of providing a smooth production flow that allows for continual improvements in process.

Key to this Japanese philosophy is reducing work in process (WIP), as well as reducing lead times, inventory and setup times. IBM incorporates Kanban in its Continuous Flow Manufacturing concept.

The two ideas merge on the factory floor in many IBM plants where Kanban signs stand over workstations. Numbers are posted below the Kanban sign to represent the minimum and maxium WIP allowed at a workstation to maintain continuous flow down the line. In this manage-by-sight system, the operator can judge the pace of activity on the line by comparing the WIP at the stations with the Kanban limits.

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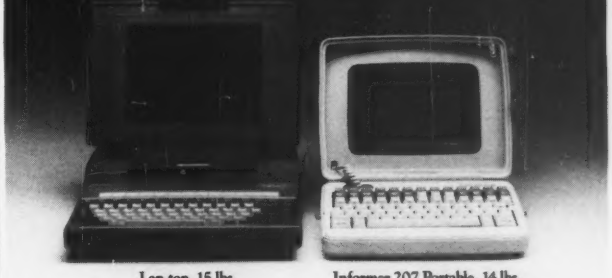

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The focal point for IBM's manufacturing expertise is the Manufacturing Technical Education Center (MTEC) in Thornwood, N.Y.

Founded in 1980, MTEC was created because, "we desperately needed to enhance the knowledge of our manufacturing people, and we found that the universities were inadequate in this area," says Sam Korin, MTEC's director. "There were some programs, but it was spotty. There wasn't one place to obtain the broad range of knowledge we wanted our technical professionals to have. So we created our own, in-house."

One of five educational programs housed in IBM's 300,000 sq-ft Corporate Technical Education Center, MTEC offers classes on-site as well as on a satellite network to individual plants. Last year, 1,050 IBM employees attended classes offered by the center. Faculty members are recruited from the top ranks of IBM's engineers and managers.

"We search for people who have competence in a special area and who, at the same time, have a knowledge of IBM," Korin says. "Most of them have worked in more than one product area so they have a broad appreciation of how the company operates."

Such qualifications are essential because the subject matter covered at MTEC usually includes proprietary information.

"Within the scope of an area, such as surface-mount technology, optoelectronics or contamination control, we teach things that are not being taught or cannot be taught, because we have proprietary capability or knowledge," Korin claims.

The institute takes security measures to prevent competitors from gaining access to certain aspects of the curriculum. For example, satellite transmissions — which orginate from a control center in Thornwood — are digitized and encoded, rather than sent in an analog format, to prevent interruption from outside sources.

One of the most important MTEC courses is "Managing Materials and Process Technology" (MMPT) because it is designed to provide materials managers with an understanding of the chemical processes required to make current IBM products.

"MMPT takes the technical professionals from one culture and puts them into another," Korin says.

Spreading out expertise

In the past, chemical technology expertise was restricted to the staffs at semiconductor plants in Burlington, Vt., and East Fishkill, N.Y. The other locations were known as "box plants" because they built systems requiring only mechanical assembly.

Today, everything from keyboards to magnetic-disk heads requires chemical processes and relies less on mechanical assembly, Korin says. In a keyboard, for example, the only mechanically assembled component is a spring that clicks to let the user know he has pressed a key. Magnetic-disk read/write heads are manufactured using thin-film technology — a chemical process that deposits copper to form a spiral coil rather than mechanically winding hard wire. The chemical processes require plating and depositing techniques, which must be performed in a clean room.

"The plants are starting to look more like Du Pont than traditional computer manufacturing," Korin says. "I go through my own culture shock every time I visit them."

MTEC is also shepherding IBM's manufacturing professionals through cultural transformations such as Early Manufacturing Involvement, which requires that a product be designed in conjunction with the manufacturing process, and Continuous Flow Manufacturing (CFM), which significantly reduces inventory.

"When you get dependent on inventory, which we were, the whole idea of not having food in the refrigerator is counter to your upbringing," Korin says. "To go hand to mouth like this suggests you may not be able to deliver your product, and that is heresy at IBM."

IBM is asking its managers to take this risk to save money on inventory, work in process and logistics requirements.

"What we didn't understand is that you don't need the protection of inventory if you have a system worked out with your suppliers and your own people that disciplines them to keep the process flowing continuously," Korin remarks.

Still, the transition is not easy. "It's like being left-handed all your life and being forced to go to using your right hand," he says.

Until recently, MTEC relied on a 10-week course — permeated with CFM training — to indoctrinate its students in most of the concepts of IBM's manufacturing technologies. The course has been postponed this year because the corporation is focusing more on skill building and less on concepts.

John Bruggeman and Cinda Koehler, *instructors at IBM's Manufacturing Technical Education Center, experiment with a robotic arm.*

With a large number of manufacturing employees being transferred to other operations and the reorganization that is required by new automated lines, the plants are each conducting extensive retraining programs, and the emphasis at MTEC is on skills that can be applied quickly to the workplace.

CIM refocused

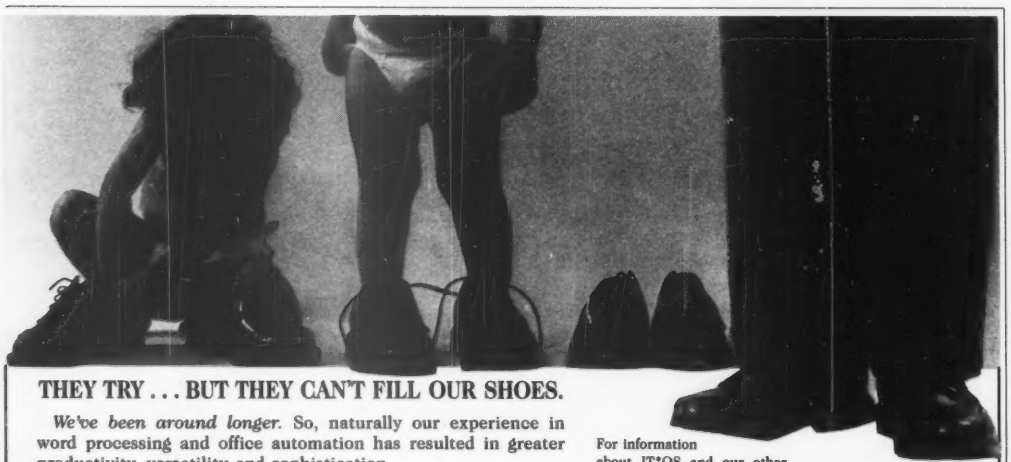
Among the courses currently offered at MTEC is "Integrated Manufacturing Systems," IBM's name for computer-integrated manufacturing (CIM). "We call it by a different name because we don't want to highlight the computer as the key component of the manufacturing system," Korin states. "It's only one of the components."

Another course is "Materials Science Manufacturing," which presents an overview of the properties of materials used in microelectronics. The patterning and depositing of thin-film technology is reviewed, as well as plasma use and ion-beam processing. Other courses cover contamination control, surface-mount technology, optoelectronics and expert systems.

As the gathering place for experts in IBM's manufacturing techniques, MTEC provides one other service, which Korin calls "cross-pollination." Managers and engineers from plants throughout the world take advantage of MTEC's formal and informal sessions to exchange ideas. Korin says such discussions lead to more efficient processes as well as promote consistency among the plants. This consistency is especially important because of IBM's tendency to transfer work between plants in response to fluctuating market demands.

"This is the most interactive, interdependent company of any I've ever seen," Korin maintains. "We have more people in the air at any one time than anybody else."

MICHAEL SULLIVAN-TRAINOR



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FROM PAGE 79

now acceptable, and many of the plant's inspectors have been retrained and moved to other jobs.

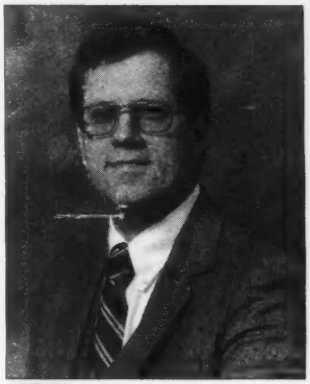
The prejudice toward in-house product construction does not carry over to manufacturing processes. Here, the Lexington plant's approach is to use what works — whether it is IBM's or someone else's part.

"We choose machines that are effective in manufacturing capability, rate of build, quality and cost. We buy them if they already exist rather than build one of our own. We don't want to re-create the wheel," Ellmann says.

In addition to not wanting to duplicate others' work, Lexington uses outside vendors for its manufacturing processes because there often is not time to develop a process in-house.

"Technology races ahead so quickly that if we waited for the latest process to be developed, we would never get into building an efficient product," he says.

For example, to accommodate the Proprinter line, IBM hired Jervis Webb, a manufacturing systems integrator in Farmington Hills, Mich., to implement an IBM-designed production line that uses a combination of robotics and manual assembly.



"THE diversity presents us with a greater challenge. Also, it allows us to be more vertically integrated than other plants."

LARRY OSTERWISE
IBM ROCHESTER

The willingness to use other vendors' manufacturing equipment does not prevent IBM engineers from experimenting with automation, however. Such experimentation led to breakthroughs such as the first tactile sensing robot.

"In 1980, IBM developed robotics that had tactile capability," Boston University's Rosenthal says. "They were used within the company before they were released to the public. They are able to sense the difference between electronic parts by touching them.

"They allow flexible manufacturing capability because the robotics are no longer just assembling the same components day-in, day-out. They allow you to mix a sequence of different kinds of boards in the assembly line depending on production requirements," he says.

Although they perform assembly tasks in many of IBM's plants, the robots also perform less complex tasks than parts differentiating. At one point, they were used by Lexington plant engineers to stamp bar code labels on products.

"It's not an application we would have chosen for a sophisticated robot, but it grew out of the plant manager's telling the engineers that they needed to work on the line," Ellmann says. "So one day, the engineers brought their toys with them."

'Succotash plants'

Other plants are more difficult to automate than Lexington because of dissimilar product lines and product change due to workload balancing. Within IBM, facilities of this type are jokingly called "succotash plants," to signify the mix of products they are producing.

Located about 90 miles from Minneapolis, the 7,000 employees at IBM's Rochester, Minn., plant use a mixture of automated and manual processes to produce the System/36 and 38 processors, the System/36 Personal Computer and direct-access storage devices (DASD) ranging in capacity from 20M to 400M bytes.

"The diversity presents us with a greater challenge," says Larry Osterwise, site manager of the Rochester facility. "It requires more knowledge and experience. Also, it allows us to be more vertically integrated than other plants."

Pilot lines at Rochester build circuit boards used in the intermediate systems. Disks and disk heads are assembled and also put into the mid-range products.

Touted as the largest IBM facility under one contiguous roof, the 3.6-million-sq-ft plant is equivalent in size to 76 football fields. While there are larger sites within IBM, Rochester holds its title by maintaining covered walkways that connect most of its 31 buildings.

The walkways are vital to the vertical integration of the plant and the implementation of CFM. Automatic guided vehicles called "Raymonds" roam the corridors, taking parts to assembly lines and finished goods to transfer locations.

Unlike the highly automated, unified processes of Lexington and Poughkeepsie, Rochester is a plant of multiple personalities, with each area manager applying different resouces to meet CFM goals.

"We're trying to continue our quality record, reduce cycle time and improve our efficiency and flexibility," says Al Moschner, System/36 and 38 product manager.

CFM, implemented in 1984, is already generating significant benefits. In circuit boards, for example, in which $500,000 worth of inventory moves along the line daily, the cycle time — from the start of build to delivery — was reduced from 20 days to less than five. "If you multiply 15 days by $500,000 a day, you can see that CFM gives us a tremendous amount of leverage," Moschner says.

'Pull' system

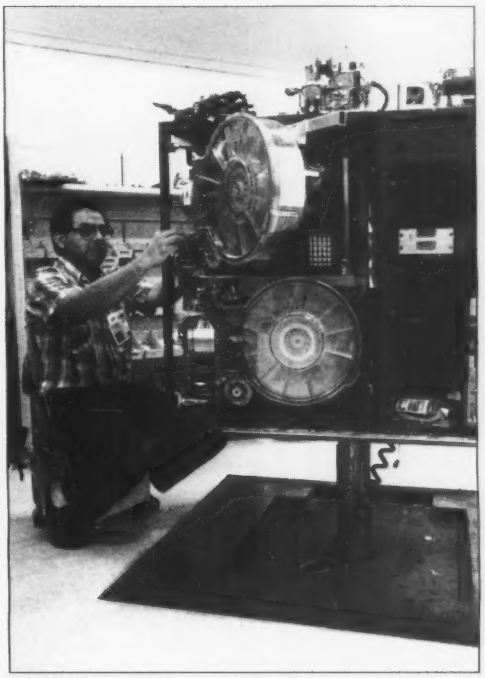
CFM also allows the plant to be more flexible. "The industry has had its ups and downs of recent times. If the business is stalling, you want to turn off your manufacturing engine as quickly as you can," Moschner says. "If you've got long cycle times and you have all this stuff in process, you've bought the farm. So the shorter the cycle time, the less risk you have in a downside. And if your business is up, it takes less time to react to the upside."

While production volumes for each product are based on market forecasts, which fluctuate monthly, the subassemblies of certain products are built according to a "pull logic system."

An integral part of CFM, the pull system allows one department — such as systems — to pull the parts to build its products from another department — such as disk assembly — as needed. This system reduces work in process and inventory, because the supplying departments await actual requests from the pulling departments instead of building up inventory based on estimates. The system also includes buffers with Kanban limits that prevent too many or too few parts being built at any one stage of the process.

Other manufacturing concepts are implemented in a unique fashion at the plant. In the 5¼-in. hard-disk area — where Model 0665 20M- to 40M-byte disks are made for Personal Computer ATs and PS/2s — a "clean tunnel" is used instead of an industry-standard clean room.

Workers, wearing white



A Rochester worker *assembles the System/36, which is raised on a hoist for easier access.*

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THE first time Tom Leffler and his team from Unisys met with Home Shopping Network they recognized a big idea whose time had come.

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At the core of the idea, a computer system. A system that could satisfy their immediate needs, but could also grow, and fast. There would be no time for software conversions. And, if that system wasn't in place on time, that window of opportunity would slam shut.

"We started working with HSN in April 1985. They were scheduled to go national on July 1, 1985. There were three months to rewrite an application, build a computer room and get on-line with a national system."

Working with the LINC productivity tool and nine Unisys professionals, HSN had a working application in 90 days. In the next 18 months, they'd grown from zero revenue to almost $700 million. "And they'd grown from our smallest mainframe to our largest computers. It's been incredible.

"But, you know what really won us the business: Unisys' entrepreneurial attitude and a willingness to get things done. We accepted our challenge to be a part of the whole plan."

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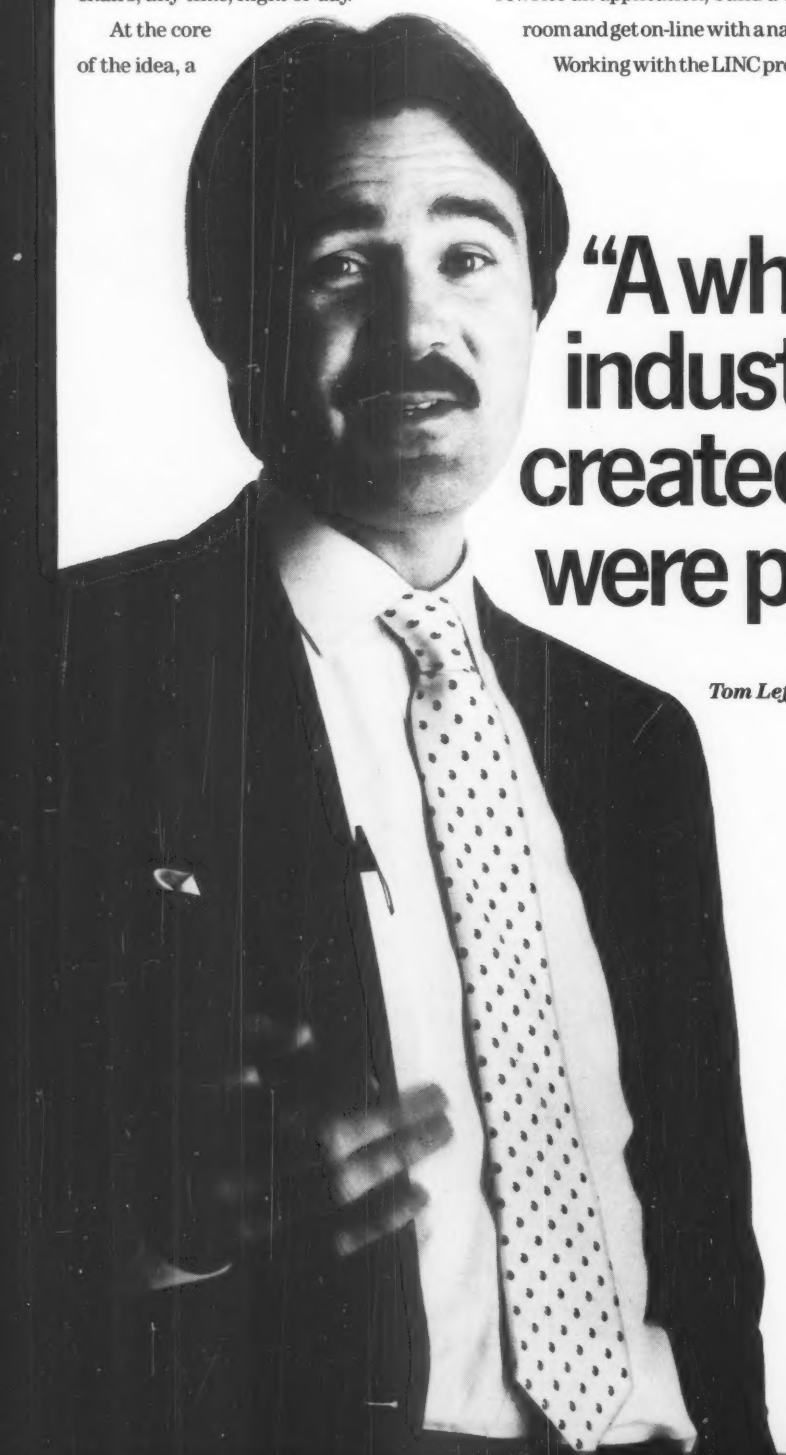


"A whole new industry was created and we were part of it."

Tom Leffler, Marketing Manager, Unisys.

UNISYS

The power of 2

hoods and gloves, assemble the hard disks by maneuvering components inside a plexiglass tunnel. The assemblers reach under the plexiglass to accomplish their tasks. Class 100 air flows down on the files from the top of the tunnel. Red lines mark the nonclean tunnel conditions of a central rectangular aisle where the workers sit.

Mobot buddies

Automation also came to the Rochester plant in many forms, the bulk of it going toward product testing. A pair of mobots (mobile robots), affectionately named "Sven" and "Olie," work inside a floor-to-ceiling clean tunnel attached to a clean room where 200M- and 400M-byte Model 9332 hard disks are made for the System/36 and 38. The mobots act as handlers, gliding on wheels and placing assembled disk packs in testers.

EMI also played a role in improving the Rochester operation, says Al Cutaia, manager of future development for Rochester's laboratory. For example, surface-mount technology used in the circuit board line required design engineering changes to the boards to enable them to be manufactured.

The temperature coefficients of the chip and the board connections "are worlds apart," Cutaia declares. When they are soldered together directly as they are in the surface-mount process — instead of connected by pins — expansion differentials occur.

"When we tested the process, we were ripping connections, and we were not able to produce a board with reliability," Cutaia says. "We solved the metallurgy problem through the design process."

The ability to implement surface-mount technology in production is a first in the industry. Other manufacturers may soon match IBM's ability to use the technology, however. In the meantime, the solution to the metallurgy problem is a closely guarded secret. Manufacturing managers will discuss it but stop at the point of the mysterious metallurgy solution. Further questions will result in the standard reply, "Sorry, that's proprietary information."

Glimpse ahead

Where will the combination of investments in manufacturing technology, fluctuating markets and new concepts lead? Perhaps the answer lies in what IBM chose to do with its latest product — the PS/2.

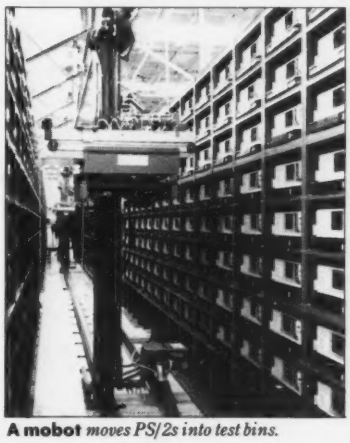
Once the site of Series/1 manufacturing, the Boca Raton, Fla., plant is now the center of PS/2 activity. Like Poughkeepsie, Boca Raton is the assembly point for parts from other plants.

To eliminate setup time for different products, all eight PS/2 models are built on common lines using a flexible pallet designed along the lines of the Lexington one. (See story above.) They are made with fewer screws than their PC predecessors, thanks to EMI in product design.

Conveyors move parts from one step to the next, and bar code readers allow the plant's host data system to track the location of all components. The data is used to prevent defective components from going farther down the line, and it is stored for the day when it may be needed to trace the cause of a problem at a customer site.

One of the last plants to implement CFM, Boca Raton relies on Kanban to reduce work in process, and supplier deliveries are made directly to the lines.

At various stages, manual processes are maintained. "We've studied the balance between automation and using human hands," says plant manager John Alcott. "We get a better return on investment by having manual assembly balanced with automated testing."



A mobot *moves PS/2s into test bins.*

CFM concepts led to the replacement of robotic bar code scanning systems by manual scanning during assembly.

"We looked at the balance of the various operations and found we could eliminate the robotic scanning by combining it with the assembly workstations," Alcott says.

As in the 9332 DASD operation at the Rochester plant, mobots are used to move the assembled systems to testing. Plugged into the test bins via a common connection, the PS/2s are tested by a computer program that can determine the difference between models.

"Common testing is a major factor," Daubenmire maintains. "If I'm bringing out a signal to a pin, and the next pin has a completely different signal, I want the facility to address that pin for what it is. We do that so it doesn't put any encumbrances on the design. It doesn't say Pin A must always be in the same location."

Of all the aspects of IBM's investment in manufacturing in Boca Raton and elsewhere, the least expensive — CFM — is the most significant, Korin says.

"We went through the '60s with value engineering," he says. "Then there was the high-volume/low-cost concept. We've introduced group technology and automation. EMI has done us a lot of good. But CFM has had the greatest impact because it requires cultural change."

What is next? "More of the same," Korin says. "We will be preparing our people for assembly of products atom by atom, molecule by molecule. We're already talking in terms of molecular thicknesses.

"We've already proven you can make perfect ball bearings and silicon crystals of extraordinary purity and size in space," Korin continues. "The next dramatic evolution will be in zero-gravity manufacturing."

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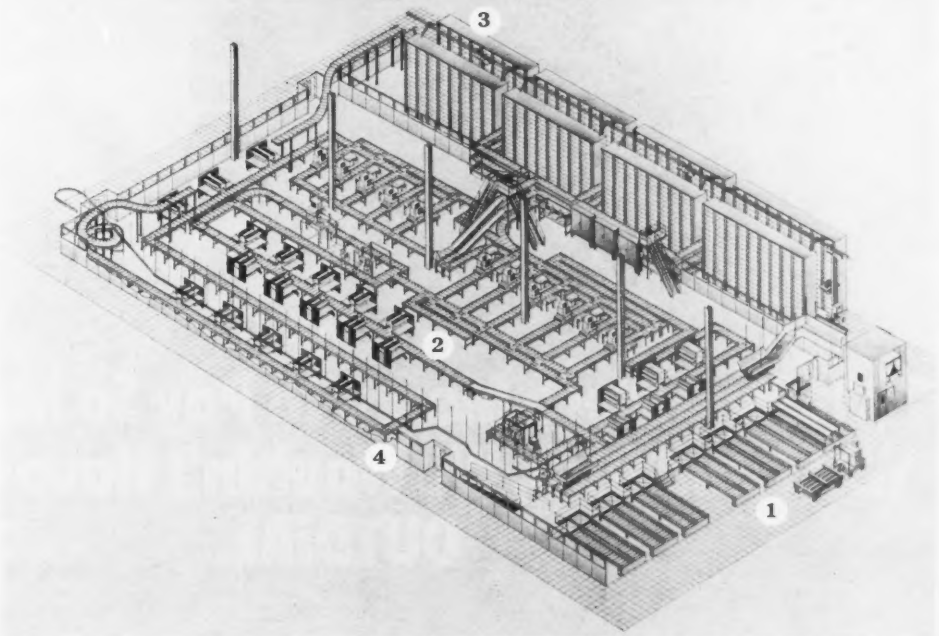
Personal System/2 assembly line



Production of the IBM Personal System/2 — a 10-hour process — begins with (1) kitting, where parts from other IBM plants and outside vendors are placed together on a common pallet. Designed to fit all eight PS/2 models, the pallet carries the system throughout the operation. After workers stick a bar code label on the frame, the system moves down a conveyer to (2) assembly.

Once there, an assembler, wearing a wrist strap to ground him, plugs in wire connectors and uses a touch-screen IBM Personal Computer XT that relays assembly instructions and notifies an IBM host of the completion of each operation. In addition, the assembler uses a laser scanner to read the bar code, transmitting the location of the system and its major subassemblies to the host. Finally, the assembler plugs in a connector block, common to all models regardless of size, and inserts a test diskette, which is used as a log for (3) the test process.

After an initial screening, a mobile robot (mobot) lifts the nascent PS/2 off the conveyor and plugs it into a slot in one of the test bins (see photo below). The connector block allows the mobot to automatically insert the system into the correct location, and the computer-controlled running test system determines which model it is handling from the bar code data.

An inspection is conducted before the system moves to (4) cover-fitting and final assembly, after which the PS/2 travels up a spiral conveyor and disappears into the packaging complex.

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That danger, which should be included in debates over the merits of hostile takeovers, becomes clear in viewing the three-way battle for control of Allegis Corp., the parent of United Airlines.

Allegis is being pursued by United's pilots on one flank and by a triumvirate of New York investors on the other. Their campaigns are typical of many of the more controversial corporate raids in that the aggressors seek to divide the company and spin off parts to various owners, generating a hefty premium over the purchase price and the present value of the shareholders' investment.

Arguments about the merits of this practice often revolve around the relative values of maximizing shareholders' short-term interest (in the form of what the breakup would bring) vs. their longer range interests in allowing a more traditional-minded management to pursue a long-range — and perhaps

Continued on page 86

Tax reform nixes contracts

DPMA members say Section 1706 will jack up their costs $4.4M

BY DAVID A. LUDLUM
CW STAFF

A recent survey of members of the Data Processing Management Association (DPMA) found that 15% of the respondents have canceled contracts for independent computer consultants, or plan to do so, because of Section 1706 of last year's tax reform act.

The canceled contracts represent $6.7 million worth of services — about $20,000 for each independent consultant involved — and the cancellations are expected to increase the costs of the services by $4.4 million, according to the DPMA, which has taken a public stand in opposition to Section 1706.

Section 1706, which took effect on Jan. 1, requires independent computer professionals placed in jobs by a broker to become employees of the broker for tax purposes if the broker has significant control over their work. The degree of control is determined by the application of common-law standards to individual cases.

Many organizations have interpreted the law as also calling for independent computer professionals under direct contract with an organization for which they work to become employees of that organization if it controls their work. Several pending congressional bills call for repeal of the section or delay of its implementation while it is studied.

In April, the DPMA, whose stand against Section 1706 was prompted by concerns of members who are independent consultants, polled a random sampling of its members, not all of whom are MIS managers, and received 200 replies, according to Joseph E. Collins, the group's

Continued on page 88

Telecom savvy keys execs' pay hikes

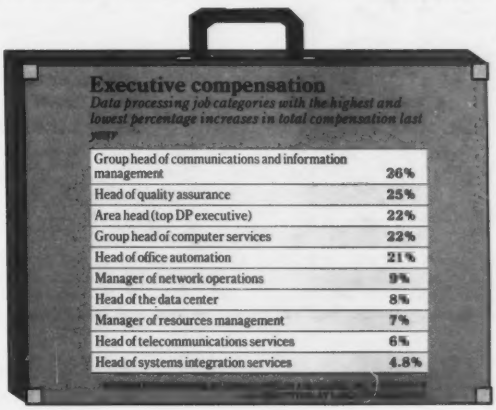
NEW YORK — Information systems executives with telecommunications experience once again have led their colleagues in salary increases, boosting their base pay 18% last year, according to the most recent edition of an annual survey.

The average pay raise reported for managers with a telecommunications background far outpaced the average increase of 7.5% for all of the 1,059 executives in 23 job categories surveyed by Edward Perlin Associates, Inc. in New York (see chart at right).

The pattern reflects a trend, established with the divestiture of AT&T, of corporations developing their own communications facilities, according to Roger O'Connor, a spokesman for Perlin.

"They're all going outside to design their own telecommunications function, both on the voice side and data. That's had the tendency of driving the technology, and as the technology gets driven, the skills get more specialized," O'Connor said.

Continued on page 88



Executive compensation

Data processing job categories with the highest and lowest percentage increases in total compensation last year

Group head of communications and information management	26%
Head of quality assurance	25%
Area head (top DP executive)	22%
Group head of computer services	22%
Head of office automation	21%
Manager of network operations	9%
Head of the data center	8%
Manager of resources management	7%
Head of telecommunications services	6%
Head of systems integration services	4.8%

Beyond the slipstick at MIT

BY DAVID A. LUDLUM
CW STAFF

CAMBRIDGE, Mass. — The faculty of MIT has approved new academic requirements aimed in part at providing engineering and science students with a better preparation for policy-making roles.

The curriculum reform strengthens an existing policy that all students study the humanities, arts and social sciences. It calls for their courses in those areas to cover a broader sweep of those fields and allows MIT students, for the first time, to graduate with a minor concentration.

The changes reflect the limitations of technical learning for policy makers and emphasize the consequences of technological undertakings and the public trust held by technical professionals, says Margaret L. A. MacVicar, MIT's dean for undergraduate education and a leader of the reform effort.

"Especially in the technical areas, students' knowledge will become obsolete very quickly. It's best to give them a strong base in terms of the most fundamental issues and a healthy respect for the approach to learning," MacVicar said.

Such an education will give students the ability to continue their education in their specialties throughout their lives "with a special emphasis on serving the

Continued on page 88

Aetna vice-chairman snares annual MIS award

William O. Bailey, vice-chairman of Aetna Life & Casualty Co. in Hartford, Conn., and chairman of White Plains, N.Y.-based MBIA, Inc., an Aetna subsidiary that insures municipal bond offerings, has been chosen winner of the 1987 Excellence in Technology Award.

The award, sponsored by the Gartner Group, Inc. in Stamford, Conn., *Business Week* and the National Computer Conference, will be presented at the conference this week. It is presented annually to a chief executive officer for leadership in managing information technology.

The sponsors cited Bailey's direction in development of Aetna's Safari system, which brought on-line real-time automation to its automobile insurance back office in the 1960s; the Aecclaims system, developed in the early 1970s, which now handles more than 200,000 transactions per day for health insurance claims; and the Gemini office automation system for independent insurance agents, which was deployed in the late 1970s.

The sponsors also noted Bailey's role in lobbying for the Privacy Act of 1974, which limits disclosure of federal agencies' information on individuals.

Bailey graduated from Dartmouth College and received a master's degree in business from the University of Pennsylvania's Wharton School. He joined Aetna in 1954 and handled underwriting and marketing assignments in its Casualty Division, followed by general management positions of increasing responsibility.

William O. Bailey

The winner of the award is chosen by a vote of a committee of eight senior information systems executives, who nominate up to three candidates each.

Strategy work lauded

One of the committee members, John W. White, vice-president of information systems and services at Texas Instruments, Inc., said Bailey was recognized primarily for his work with Aetna's information systems organization to develop its strategies and direction.

"He was instrumental in identifying where they can apply information systems in that industry," White said.

"Another thing that kind of stuck out in my mind," he added, "was that he has been involved in the information systems support area for some years. He is not a 'one-idea' type of guy."

White said that in serving on the award selection committee for several years, he has found a lack of chief executive officers who are highly qualified to win, with few additional candidates emerging from year to year.

While there are always candidates with an interest in information technology, "It is unusual to find people who have the intense interest and motivation," White said. In addition, some companies avoid publicity for strategic information systems to protect a competitive advantage, he noted.

Merger skies

FROM PAGE 85

risky — strategy.

Such is the case with the attack on Allegis, which is a conglomeration of United, The Hertz Corp. rental car operation and the Westin Hotel Co. and Hilton Hotels Corp. chains. The pilots and the investment partnership seek to buy the company and sell off some of those units, while Allegis Chairman Richard Ferris doggedly pursues his vision of the company as an integrated, one-stop provider of travel services.

Ferris's vision of a travel services supermarket relies heavily on the use of an integrated information systems network that presumably would go beyond the capabilities of other airlines, which offer combined reservation services and bonus points for the frequent-flier program through joint marketing arrangements.

At a news conference earlier this year, Ferris said Allegis would develop a unified data base for the airline, car rental and hotel operations, providing reservation agents with information such as customers' preferences in airplane seating, car models and hotels.

But Allegis has done little to deliver any benefits from Ferris's vision or even offer a more detailed view of what it entails.

The most visible step the company has taken was to change its name earlier this year from UAL, Inc. to Allegis, a melding of two Latin words that New York real estate magnate Donald Trump — also considered a possible Allegis suitor interested in breaking up the company — described as sounding like "the next world-class disease."

Call to arms

The lack of progress has helped prompt the call to arms by takeover artists, and there lies the threat that hostile takeovers pose to the concept of strategic information systems. It takes time to implement a strategic system, let alone a corporatewide strategy that depends on information systems. Today's environment of mergers and acquisitions — both friendly and hostile — doesn't always accommodate such ambitious, farsighted planning.

It should be noted that even if Ferris's grand scheme materializes quickly, some observers question it.

First, many of the services may still be within the capabilities of joint marketing programs. Second, it's not clear that customers want a one-stop travel service that would, for one thing, limit their choice of hotels. American Airlines abandoned a hotel operation several years ago, and Pacific Southwest Airlines sold its hotel and rental car businesses in the 1970s. Such doubts only add to anxieties about Allegis's lack of movement in deploying its strategy.

Corporate leaders should be accorded some protection from preoccupation with short-term results, but under the present rules of the free-enterprise game they must balance long-range returns with present value. That's one of the many sets of imperfect options that they are paid to resolve.

Corporate managers have to be responsive to reasonable expectations of customers and shareholders, at least to the extent of displaying an aggressive attitude toward developing new services and, perhaps, partial progress in deploying them — moves Allegis has not made.

Of the company's plan to integrate its travel services, John Zeeman, Allegis's marketing vice-president, was quoted last year as saying that when an organization is as successful as United, which at the time was the nation's largest airline, "it's difficult to decide to risk everything on a whole new approach."

But more recently, Frank Lorenzo, the chairman of Texas Air Corp. — which has overtaken United as the largest carrier by adding Eastern Airlines and People Express to its Continental Airlines — was quoted as saying, "History has shown that the companies that didn't take risks took the biggest risk."

Ludlum is *Computerworld's* senior editor, management.

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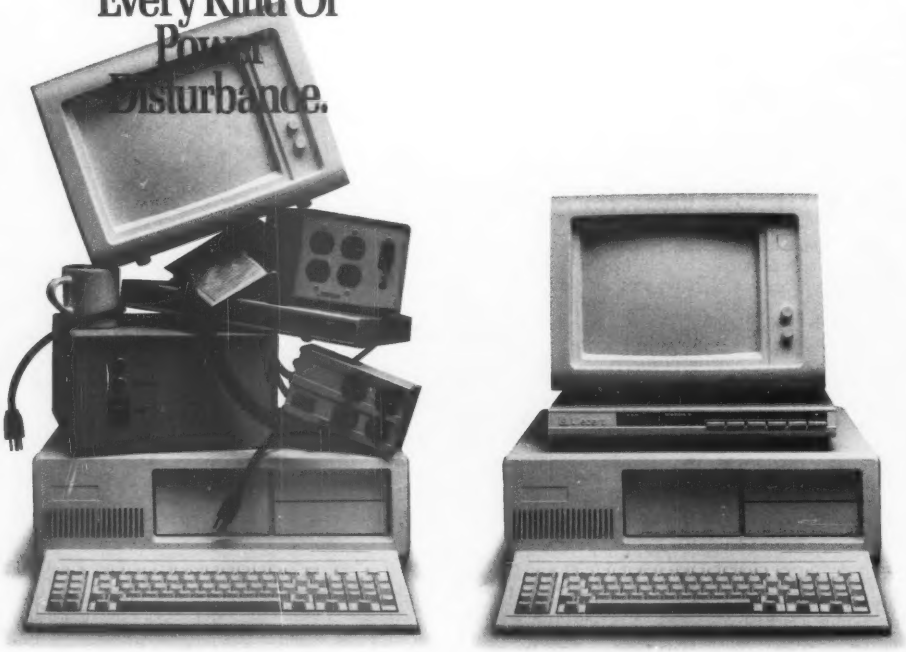

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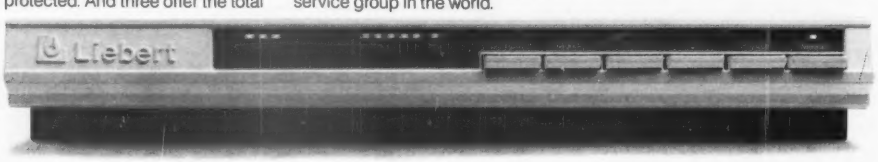

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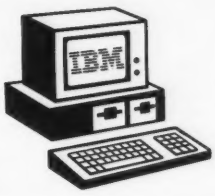

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DCWS

Tax reform

FROM PAGE 85

governmental affairs manager. "We've been assuming a lot of things would happen, and we wanted to address those assumptions in some way," Collins said.

The DPMA emphasized that 35% of the respondents reported they have changed their contracting practices or are considering changing them as a result of Section 1706.

Collins said he expects DPMA members to continue cutting back on contracts with independent consultants and their brokers and increasing business with technical services firms that use salaried employees. "People are turning away from them, and not only that, it is costing them a lot of money," he added.

Of the 35% of respondents who said they are making changes or considering them, 74% said they have canceled direct contracts with independent consultants and 60% said they have canceled contracts with brokers. Forty-eight percent said they have increased their contracting with technical service firms that use salaried employees.

Making the conversion

Collins said additional comments indicate some of these changes reflect organizations substituting a firm with salaried consultants for the services of independent consultants. He added, however, that some reflect organizations continuing to use a consulting firm that has converted from a broker of independent consultants to an employer of salaried consultants.

Some of the changes also reflect organizations that had used the services of independent consultants hiring the consultants as salaried employees, he added. "It's not the route they'd like to take, but they are because of the choices they're left with here."

More than three-quarters of the respondents making changes or considering them said they expect that doing so will increase the costs of services. Meanwhile, 18% said they expect the changes to diminish the quality of the services, while 69% said they expect no change in quality and 13% said they expect increased quality.

The survey found that before the law took effect, 29% of the respondents used technical service firms with salaried employees, 25% contracted directly with independent consultants and 6% used independent consultants placed by brokers.

As reasons for using independent consultants, respondents cited expertise, availability, low cost, quality, reliability and a heavy work load over a short period of time.

Pay hikes

FROM PAGE 85

The big pay boosts tended to go to managers of network planning and telecommunications software but not to those overseeing telecommunications services, whose average raise was reported at 6%, O'Connor said.

Strong corporate earnings last year brought some top information systems executives annual bonuses larger than their base salaries, according to the survey.

The bonuses bring total compensation for some data processing managers at the nation's largest corporations well into six figures, it found.

Bountiful batch a boon

The practice of awarding such bonuses to top information systems executives is not new, but the size of the latest round is unusual and stems from general corporate performance, O'Connor said.

"It's probably the highest we've seen to this date," he said.

The large bonuses only go to the top information systems managers, he added. "They're all seen as very critical in terms of value added to the corporation."

Among the 23 job categories, averages for total compensation ranged from $71,800 to $275,400. The professional experience of the executives averaged 21 years — 17 years in executive roles.

DP budgets at the executives' organizations averaged $80 million a year, with some more than $100 million. The organizations' DP staffs averaged 815 professionals and 1,180 total employees.

DAVID LUDLUM

MIT

FROM PAGE 85

public good," she said.

The broad curriculum reform coincides with several other changes at MIT recently, including the creation of the institute's first undergraduate concentration in MIS. This spring's graduating class was the first to have the option of taking the four-course MIS concentration within the management science degree program.

Jeff Meldman, chairman of the undergraduate management science program, said the importance of the broad curriculum reform to future MIS managers goes beyond their careers.

"MIT owes its undergraduates a general liberal education in terms of educating the person, not just the engineer. This gets people out of the idea that everything is reduced to their professional field," Meldman said.

MIT's current requirements call for all students receiving a bachelor's degree to take at least eight courses in the humanities, arts and social sciences. That requirement will stay in place.

But starting with this fall's freshman class, those students will be required to take one course in three of five broad, newly established areas: the arts; cultures and societies; historical studies; language, thought and value; and literary and textual studies.

The courses will be chosen from a list approved by the faculty. Prompted in part by student opposition, the faculty also rejected a proposal to limit the length of the list to 50 courses and agreed not to set a specific length.

Currently, students are required to take courses in three of 23 more narrow liberal arts fields, making it possible that all three are, for example, from the social sciences. Those three courses must be chosen from a list of 156.

MIT's MacVicar

With the reform, students also will have the option of taking six courses in a related field of the humanities, arts and social sciences to graduate with a minor concentration in that field.

As a longer range goal, the reform effort is aimed at the creation of "contexts" courses that MacVicar said would address "the human contexts in which science and technology are pursued," stressing ethical and social issues. Three such courses may be tried out within the next year, she said.

Another future thrust of the effort may be creation of a new degree program in "technical liberal studies" that will seek to combine competency in the two areas, MacVicar said.

The reform was proposed by the faculty's Institute Committee on the Humanities, Arts and Social Sciences. It was debated and approved by a large majority during a vote at a May 20 meeting attended by about 150 of MIT's roughly 1,000 faculty members. A petition opposing some of the changes was signed by 1,500 students.

Square pegs?

The reform movement has raised questions of whether students might have to cut back on technical courses, which could threaten accreditation for some programs, and whether engineers can adequately study technology and the liberal arts in four standard academic years.

"It's quite possible there just isn't enough time for both," MacVicar said. If not, the solution is not yet clear and could involve graduate school, continuing education or a 12-month undergraduate school year, she said.

She added that the reforms have not been prompted by a crisis. "Some people are asking, 'What's wrong?' But the fact of the matter is, things are going quite well, and our students are in great demand," MacVicar said. "The question is whether this will remain to be true and whether this nation can maintain and, in some areas, regain its preeminence."

CALENDAR

JUNE 21-27

International Conference on Neural Networks. San Diego, June 21-24 — Contact: IEEE First Annual ICNN, Nomi Feldman, 3770 Tansy St., San Diego, Calif. 92121.

Uccel 1987 Systems Software Conference. New Orleans, June 21-25 — Contact: Maxi Greer, SSC Registration, System Software Division, Uccel Corp., P.O. Box 660054, 6303 Forest Park Road, Dallas, Texas 75266.

The Payments Institute. Boulder, Colo., June 21-26 — Contact: Barbara Hill or Sandy Kennedy, National Automated Clearing House Association, Suite 640, 1901 L St. N.W., Washington, D.C. 20036.

Integrating Publishing Systems. Newton, Mass., June 23-24 — Contact: Bruce Schatzman, Xerox Systems Institute, Xerox Corp., 475 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Windows/Pagemaker Desktop Publishing Forum. Los Angeles, June 23-24 — Contact: Betsy Nagle, Hara & Associates, Suite 301, 2 Nickerson St., Seattle, Wash. 98109.

KBS 87: The Knowledge Based and Expert Systems Show. London, June 23-25 — Contact: Online International, Pinner Green House, Ash Hill Drive, Pinner, Middx HA5 2AE, UK.

Software Tools 87. London, June 23-25 — Contact: Online International, Pinner Green House, Ash Hill Drive, Pinner, Middx HA5 2AE, UK.

A/E/C Systems '87 — The Eighth International Computer and Management Show for the Design and Construction Industry. Washington, D.C., June 23-26 — Contact: Conference Director, A/E/C Systems '87, P.O. Box 11318, Newington, Conn. 06111.

1987 National Educational Computing Conference. Philadelphia, June 24-26 — Contact: Frank L. Friedman, NECC '87, Department of Computer and Information Sciences, Box JAI, Computer Activities Building, Temple University, Philadelphia, Pa. 19122.

JUNE 28-JULY 4

4th Annual Microcomputer Managers Association Meeting & Show. New York, June 29-30 — Contact: Annie Zdinak, H. A. Bruno, Inc., 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

NCITD International Trade and Computerization Conference and Exhibition. Washington, D.C., June 29-July 1 — Contact: Eugene A. Hemley, National Council on International Trade Documentation, Suite 1200, 350 Broadway, New York, N.Y. 10013.

Syntopican XV. Dallas, June 29-July 2 — Contact: Association of Information Systems Professionals, 1015 N. York Road, Willow Grove, Pa. 19090.

JULY 5-11

Digital Document and Image Automation: User-to-User Forum I. New York, July 7-9 — Contact: Randy Martin, The Yankee Group, 200 Portland St., Boston, Mass. 02114.

JULY 12-18

Fourth Annual Information Center Conference & Exposition. New Orleans, July 12-16 — Contact: Julia Stasio, Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

IBM Users/DEC Users Computer Security Conferences. Philadelphia, July 13-14 — Contact: Computer Security Institute, 360 Church St., Northboro, Mass. 01532.

AAAI-87, The Sixth National Conference of the Ameri-

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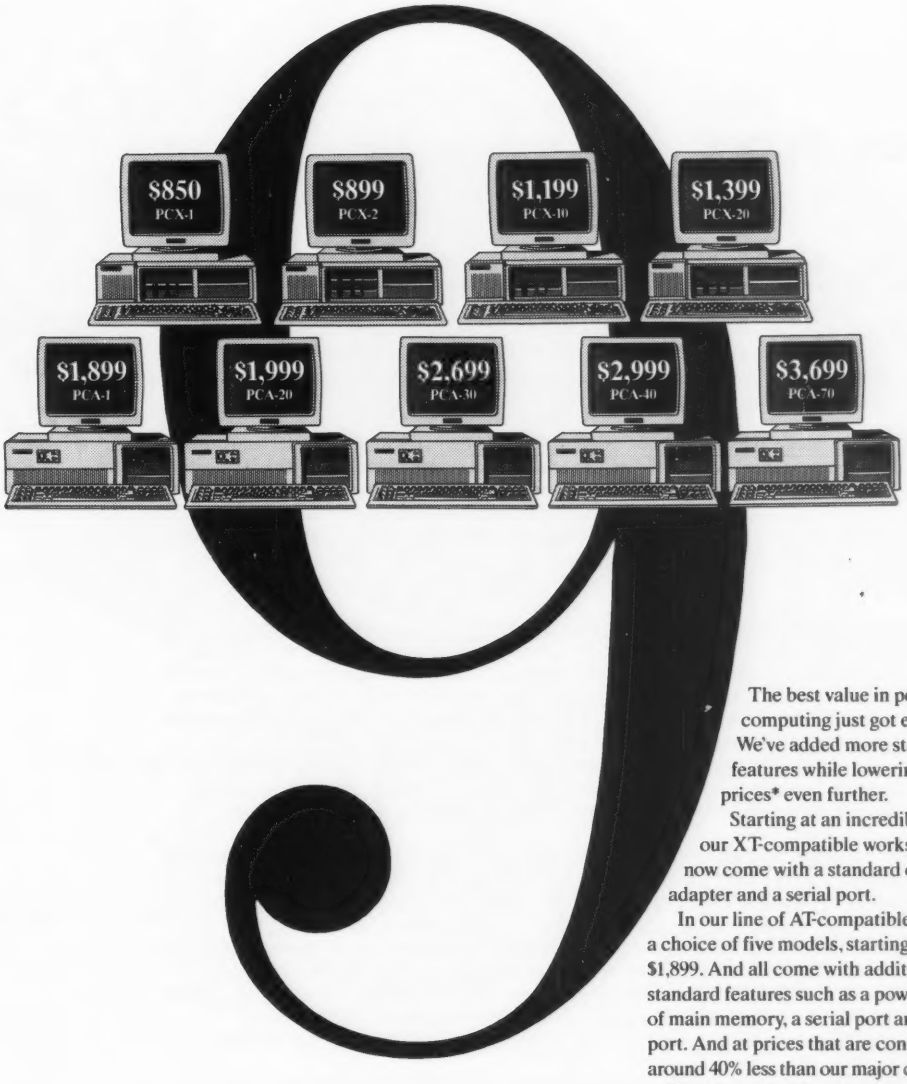

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can Association for Artificial Intelligence. Seattle, July 13-15 — Contact: AAAI-87, 445 Burges Drive, Menlo Park, Calif. 94025.

Chief Information Officer: Teaming for Profit. New York, July 14-15 — Contact: William Smulsky, The Yankee Group, 200 Portland St., Boston, Mass. 02114.

JULY 19-25

AM/FM International Conference X. Snowmass, Colo., July 20-23 — Contact: Barbara Emery, Automated Mapping/Facilities Management International, Suite 820, 8775 E. Orchard Road, Englewood, Colo. 80111.

The Federal Desktop Publishing Conference and Product Showcase. Washington, D.C., July 20-23 — Contact: FDPC coordinator, 3825-I S. George Mason Drive, Falls Church, Va. 22041.

The Desktop Publishing Conference. Arlington, Va., July 21-22 — Contact: The JLS Group, Inc., 7485 Demille Court, Annandale, Va. 22003.

National Fincom: National Financial and Computer Automation Conference. New York, July 22-23 — Contact: Jim Mion, H. A. Bruno, Inc., 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

Microtrends '87. New York, July 22-24 — Contact: International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

JULY 26-AUG. 1

Computer Associates International, Inc. Annual User Conference. Orlando, Fla., July 26-31 — Contact: Barbara Peacock, Computer Associates, 711 Stewart Ave., Garden City, N.Y. 11530.

1987 Summer Computer Simulation Conference. Montreal, July 27-30 — Contact: The Society for Computer Simulation, P.O. Box 17900, San Diego, Calif. 92117.

Siggraph '87 — The Fourteenth Annual Conference on Computer Graphics and Interactive Techniques. Anaheim, Calif., July 27-31 — Contact: Siggraph '87 Conference Management, Smith Bucklin and Associates, Inc., Suite 600, Chicago, Ill. 60601.

AUG. 2-8

Annual Remittance and Document Processing Forum. San Francisco, Aug. 2-5 — Contact: Recognition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. 05255.

25th Annual Conference of the Urban and Regional Information Systems Association. Fort Lauderdale, Fla., Aug. 2-6 — Contact: URISA, 319 C St. S.E., Washington, D.C. 20003.

Resource Access Control Facility Users Conference. Anaheim, Calif., Aug. 3-7 — Contact: Ronn Bailey, Vanguard Integrity Professionals, Suite 109, 1720 E. Garry St., Santa Ana, Calif. 92705.

The Seybold Group's Desktop Productivity Conference. Boston, Aug. 5-7 — Contact: The Seybold Group, Inc., Suite 100, 100 Homeland Court, San Jose, Calif. 95112.

Extending the Human Mind: Computers in Education. Eugene, Ore., Aug. 6-9 — Contact: University of Oregon Continuation Center, 1553 Moss St., Eugene, Ore. 97403.

AUG. 9-15

Spocade III CAD/CAM Conference. Coeur d'Alene, Idaho, Aug. 9-11 — Contact: Spocad, E. 502 Boone Ave., Spokane, Wash. 99258.

International Computers in Engineering Conference and Exhibition. New York, Aug. 9-13 — Contact: American Society of Mechanical Engineers, 345 E. 74th St., New York, N.Y. 10017.

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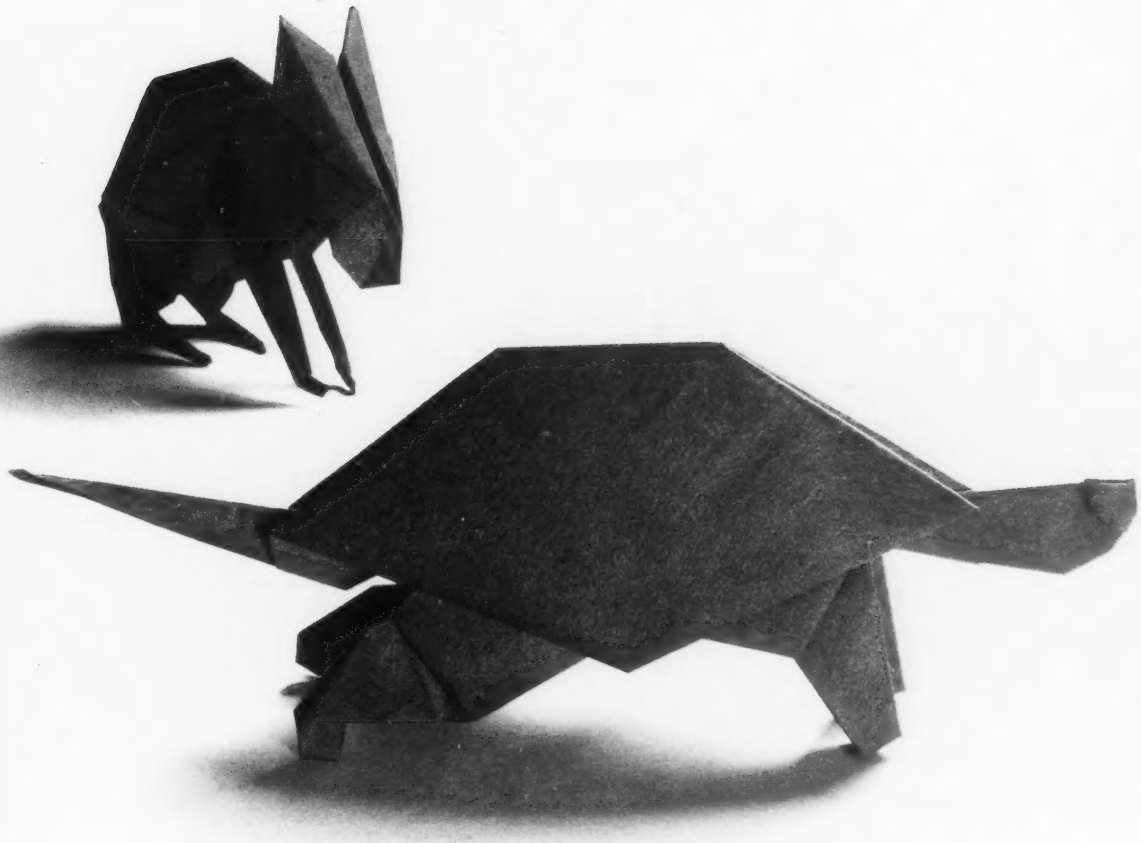

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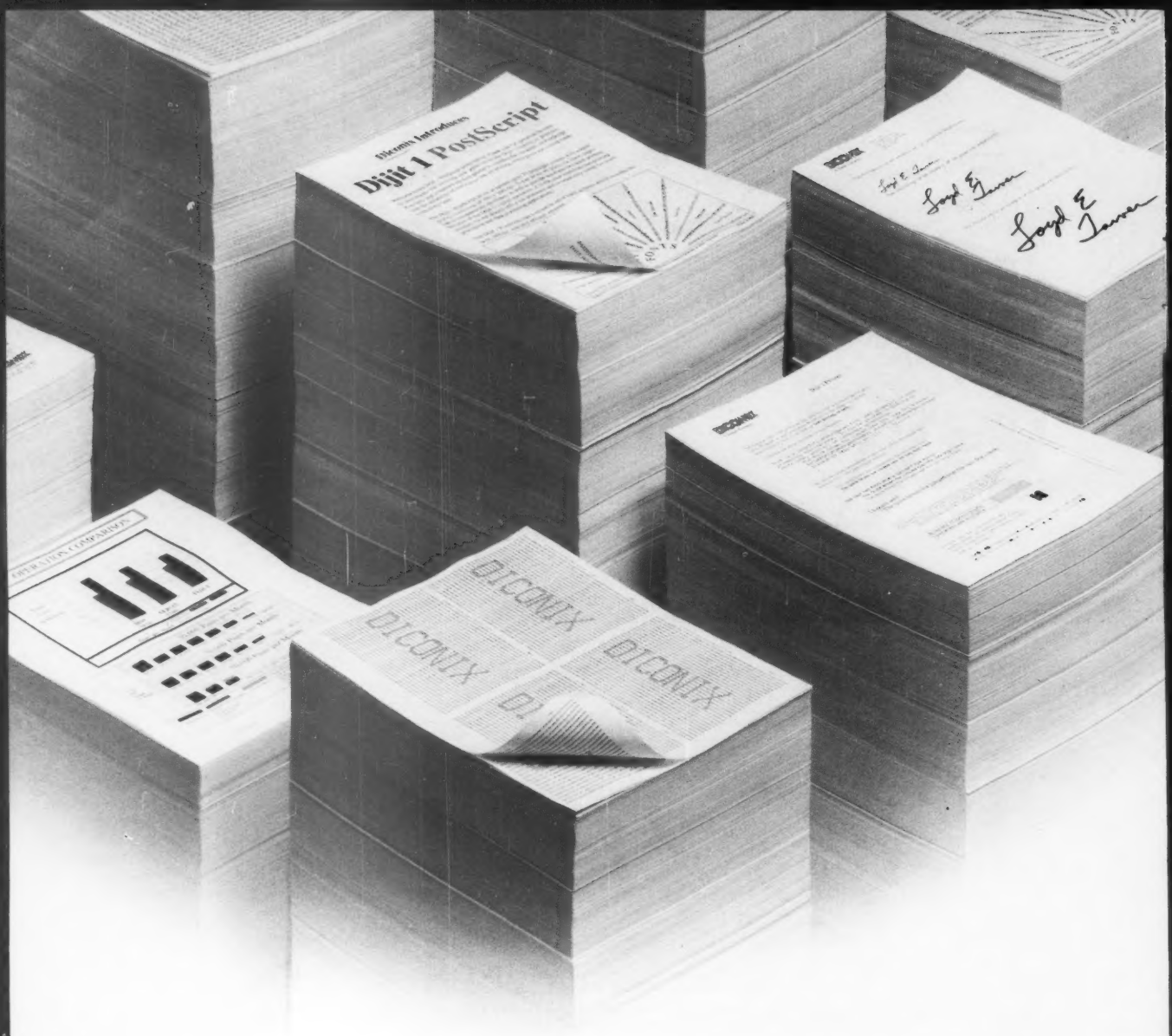

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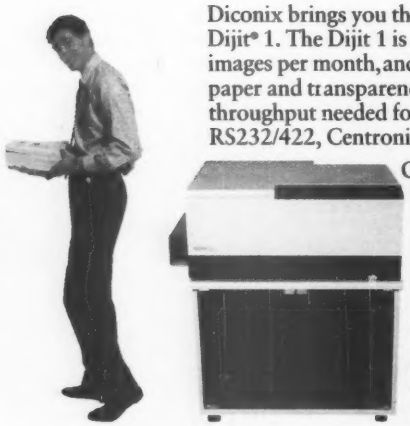

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COMPUTER INDUSTRY

INDUSTRY INSIGHT

James A. Martin

Teaming up for survival

Imagine how much could be learned by placing a hidden tape recorder beside the bed of a top Silicon Valley semiconductor executive.

Such an exercise in espionage could prove rewarding not just for its prurient appeal but for the collection of buzzwords that the executive would undoubtedly blurt out in his sleep.

During the worrisome times since the early '80s, the eavesdropper would have repeatedly recorded such words and phrases as "deficit," "book-to-bill declines," "niche market" and "Japan" from the bedside of the restless chief executive officer.

These days, however, there might be a few more snoring sounds recorded, interrupted from time to time by the latest buzz-phrase to emerge during rapid-eye-movement sleep: "strategic partnership."

Saying the J word

It has become apparent to just about everyone that the U.S. chip industry is only going to make it if manufacturers stick together and join forces. That includes not only working with other U.S. chip companies but also with those from abroad. Yes, that includes Japan.

At a recent semiconductor conference in New York, James Diller, president of Sierra Semiconductor Corp. in San Jose, Calif., summed it up succinctly: "It's virtually impossible now for a new or even established semiconductor company to do everything on their own. The key today is to focus on what you do best and use alliances to complement the rest," he said.

In the past, U.S. semiconductor companies prided themselves on doing things their way, standing strong and independent. Times changed, however, and before they knew it, the Japanese were underpricing and overselling the U.S. companies at every opportunity.

Then the bottom dropped

Continued on page 98

Reagan cuts sanctions by 17%

Says Japanese vendors making headway in curtailing chip-dumping

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — In a goodwill gesture toward Japanese Prime Minister Yasuhiro Nakasone, President Reagan last week reduced the U.S. trade sanctions against Japan by 17% on grounds that Japanese manufacturers have made progress in implementing the 1986 semiconductor trade pact.

But Reagan said Japanese compliance with the semiconductor agreement was too modest to completely eliminate the punitive tariffs imposed six weeks ago on certain imported Japanese electronic products. The 100% tariffs remain in effect for 16-bit laptop and desktop microcomputers, certain power tools and 18- and 19-in. television sets.

The president's action, taken at the start of a Venice economic summit with allies, removed the 100% tariffs levied on 20-in. television sets and thus trimmed the $300 million sanctions package by $51 million, or 17%.

Reagan said the partial lifting of sanctions was strictly proportional to the improvement in the Japanese semiconductor trade practices that had triggered the sanctions. The bilateral semiconductor trade pact requires Japan to, among other things, stop dumping chips in third-country markets and open its own domestic market to U.S. vendors.

Curtailing practice

Administration officials said the move was based on U.S. Department of Commerce figures showing that Japanese chip makers were curtailing the practice of dumping — or selling below market value — dynamic random-access memory (RAM) chips in third countries. The Commerce Department has defined fair market value as 8% above the cost of producing the chips. Preliminary figures showed that Japan was selling dynamic RAM chips at 88% of fair market value in May, up from 59% in February and 84% in April.

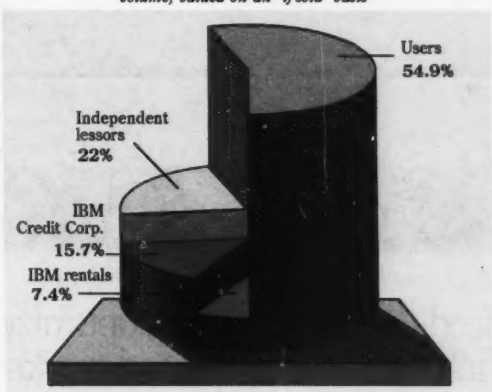
Reagan's announcement was supported by the U.S. Semiconductor Industry Association (SIA), which had pressed for the sanctions. "We agree with the president's statement that dumping of dynamic RAMs appears to have declined. There may also have been some improvement in the unfair trading of EPROMs [erasable programmable read-only memory chips]," said Andrew A. Procassini, SIA president.

Continued on page 99

Data View

IBM U.S. hardware distribution, 1986

Third-party lessors accounted for $4 billion of the $18 billion total volume, valued on an "if-sold" basis



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CW CHART: SUSAN ALDAM

Novell will sell direct to users

BY ALAN RYAN
and PATRICIA KEEFE
CW STAFF

PROVO, Utah — Under pressure from some of its largest users, Novell, Inc. is preparing to launch a direct sales program that is expected to account for 10% to 15% of its revenue next year.

"The pressure became so great we had to do something," said Craig Burton, Novell's vice-president of corporate marketing and development, in an interview at the recent Comdex/Spring '87 in Atlanta. While acknowledging that Novell "doesn't know how to sell to corporate accounts," Burton said the company is "in a unique position to be the glue between MIS and the work group."

Novell plans to expand its existing limited direct sales effort to provide corporate users with sales, service and support of its

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Inside

- Kodak division sues Iomega for breach of contract. Page 96.
- Lotus CFO announces resignation. Page 96.
- Mentor seeks damages of $18M from EDA Systems. Page 102.

Unipress rides the Unix train

BY ALAN ALPER
CW STAFF

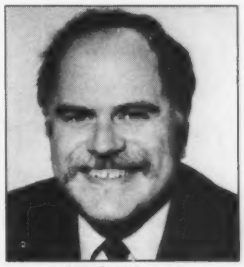
EDISON, N.J. — The gradual emergence of Unix as a basic market requirement is helping a small software publishing house position itself as a one-stop shopping center for Unix-related programming tools, languages and applications.

Unipress Software, Inc. was founded four years ago without the aid of venture capital by software consultants Mark Krieger and Fred Pack. At that time, Unix was still the divine provenance of computer hackers and scientific and technical users.

Like other Unix advocates at the time, Krieger and Pack pinned their hopes on expectations that the operating system would soon go mainstream. Their optimism was fueled in part by the hope that AT&T — the developer of Unix — would eventually be permitted to enter the commercial computer business and would flood the market with Unix systems. While the acceptance of Unix has been slow, Unipress has prospered by sticking to a conservative financial plan and focusing on what it does best: marketing products.

Unipress says its guiding philosophy is to leave costly software development to others. Drawing from a wide range of business applications, communications software, languages and tools from a phalanx of garage-shop operations and part-time developers, Unipress publishes products that it has test-marketed for sales potential.

"We do not take the risk, the developer does," says Pack, Unipress's vice-president. "We find programs that are well-written and measure them against the market requirements. We offer the author a market, technical support and 30 different machines to test his program on."



Mark Krieger

Developers usually receive royalties of about 20% of the total sales of their products. Once Unipress publishes a software product, it takes over responsibility for updating and enhancing that product. "Our technical department works with the author to do updates," notes Krieger, Unipress's president.

Unipress, which earned $200,000 last year on revenue of about $2 million, markets its products directly to U.S. end users such as Ford Aerospace & Communications Corp. and Hughes Aircraft Co. as well as through distributors in Europe and Japan. The firm uses telemarketing and word of mouth to get its message out.

"You're not talking about products with a $20,000 price

Continued on page 99

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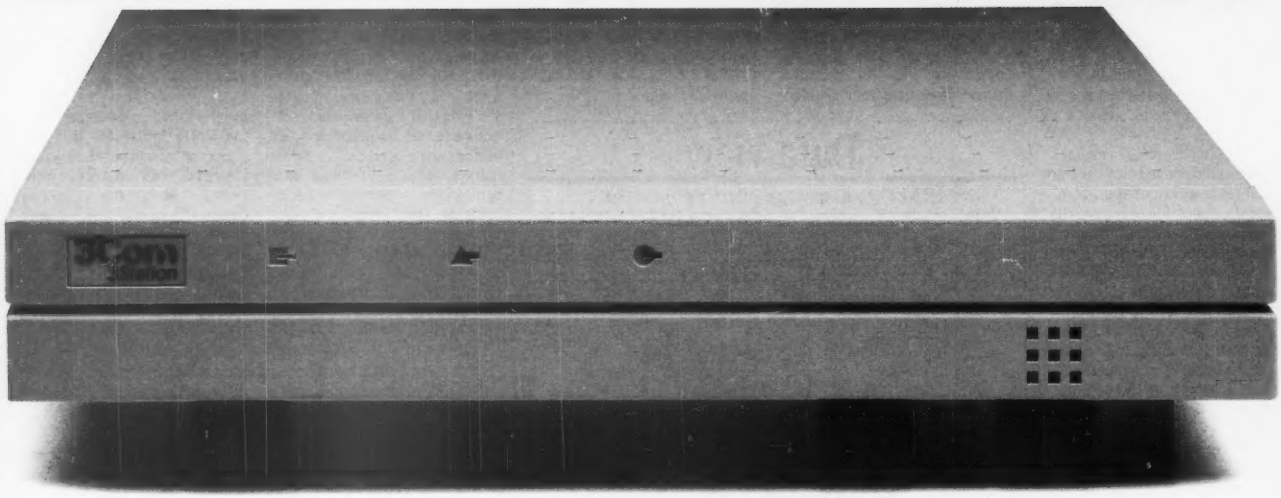

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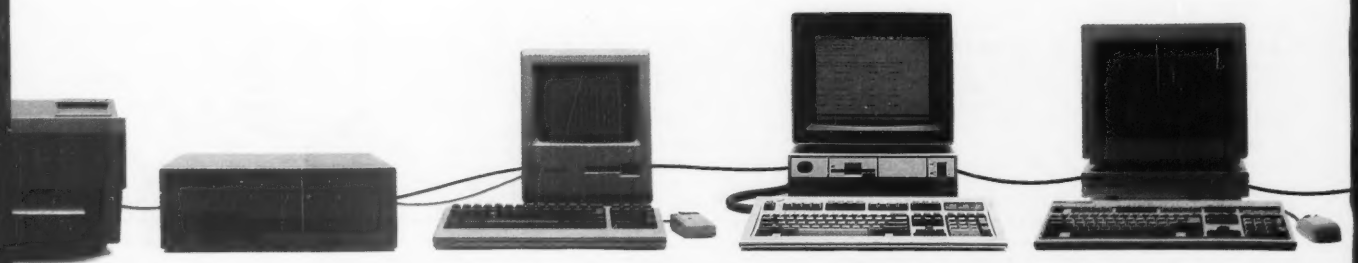

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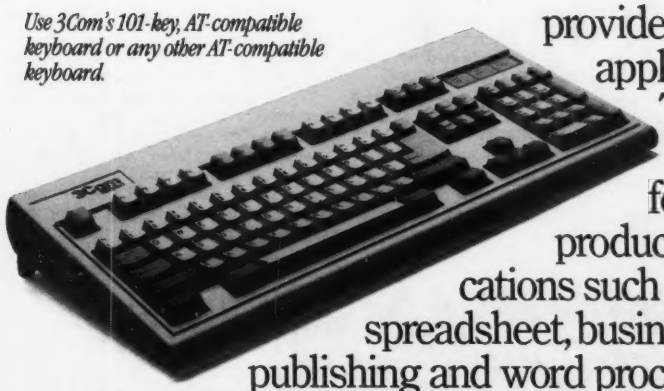

provide up to 35% more memory for your applications than adapted PCs.

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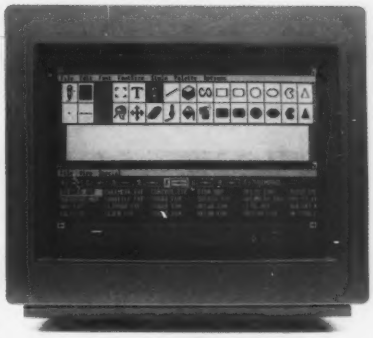

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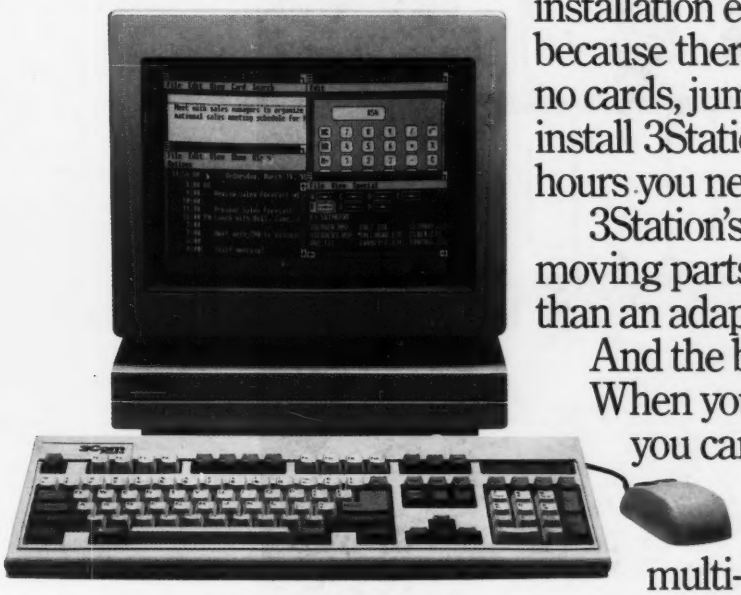
3Station's built-in EGA graphics, Ethernet adapter, I/O and memory increase performance and make installation easy because there are no cards, jumpers or switches. You can install 3Station in minutes rather than the hours you need to adapt a PC.



3Station is ideal for memory-intensive applications.

3Station's single board design with no moving parts also provides more reliability than an adapted PC.

And the best news of all?

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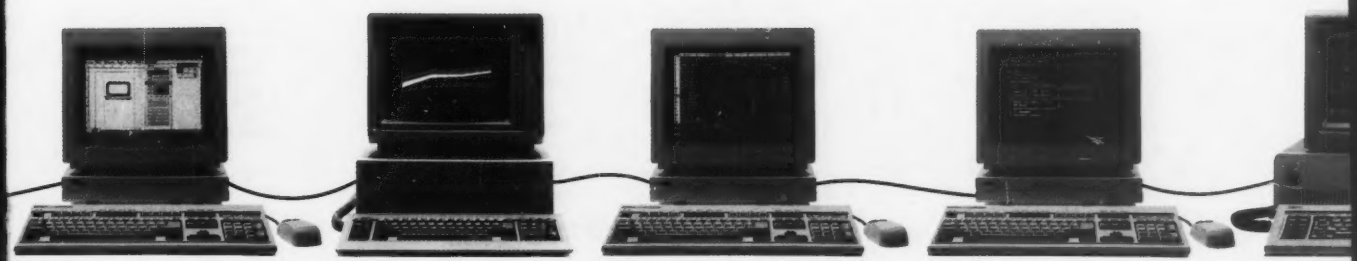

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Ex-supplier sues Iomega for $8.4M

BY ALAN J. RYAN
CW STAFF

ROY, Utah — Iomega Corp. has been slapped with another lawsuit. The financially troubled disk mass-storage product manufacturer is being sued by a former supplier, the Spin Physics division of Eastman Kodak Co.

The $8.4 million suit, filed in Federal District Court in Utah, concerns an agreement between Spin Physics and Iomega under which the former was to supply Iomega with head assemblies for use in its products.

Spin Physics is calling for payment of cancellation costs, costs it incurred for parts needed to build the head assemblies, start-up costs, payment for delivered goods and other unspecified damages, according to an Iomega statement.

Spokeswoman Linda Dalton said that when the company made the agreement with Spin Physics in 1986, Iomega was projected to grow substantially.

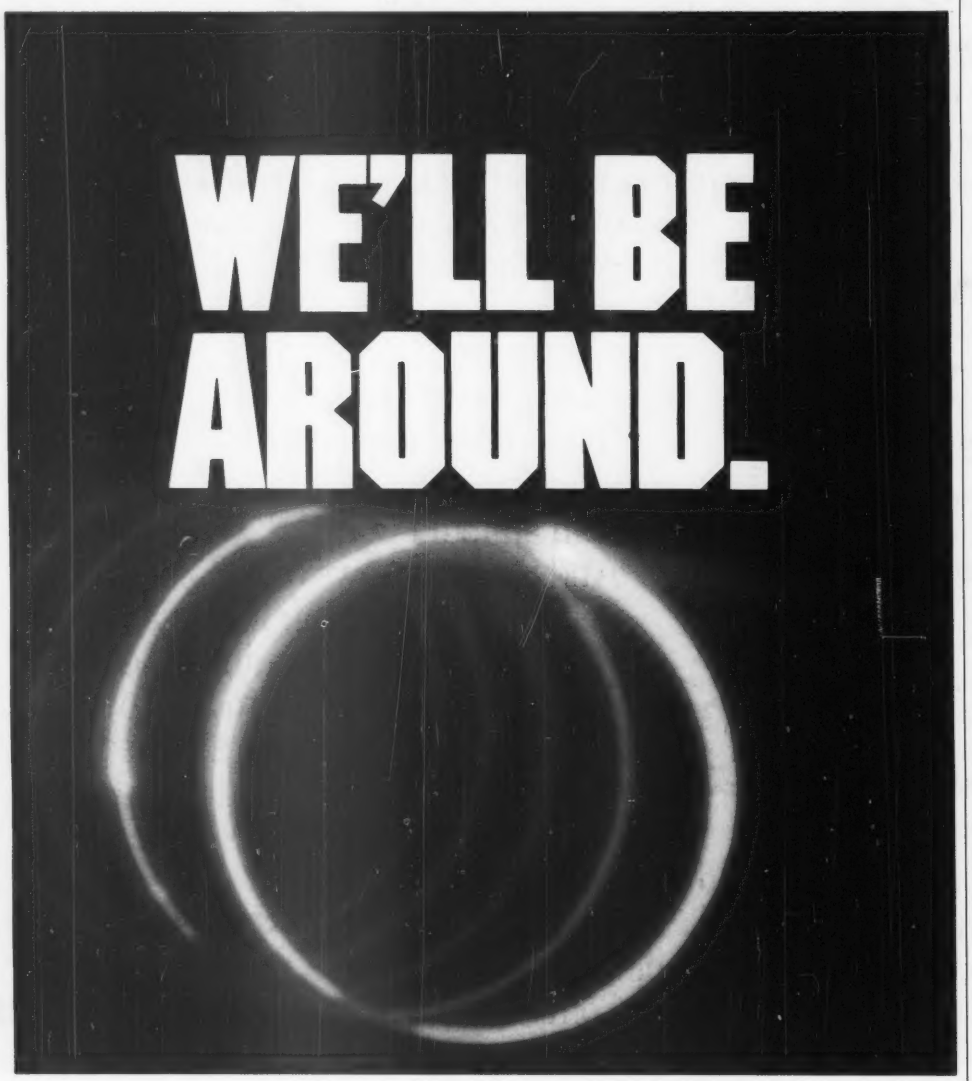
Growth not seen

"We didn't achieve that growth, so we didn't need the quantity of head assemblies agreed upon," she said.

Dalton said the company was surprised to learn of the suit. She said Iomega had set aside funds in its reserves to work the contract out.

"We were not disputing the terms of the contract, just negotiating with [Spin Physics] on the terms of the amount, and we were still in the process of negotiating when we heard about the suit," she said.

The District Court recently denied Kodak's motion for temporary relief.



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Financial exec leaves Lotus fold

BY DOUGLAS BARNEY
CW STAFF

CAMBRIDGE, Mass. — After 27 months on the job and participation in seven company or product acquisitions, E. C. "Mick" Prokopis, chief financial officer for Lotus Development Corp., last week announced his resignation.

A strong candidate to fill Prokopis's position has been identified by Lotus and may be close to being hired, but the company did not name the candidate.

Prokopis hopes to run a smaller company, or a department within a larger corporation, and intends to remain based in New England. "I have been in training to run a company," he said.

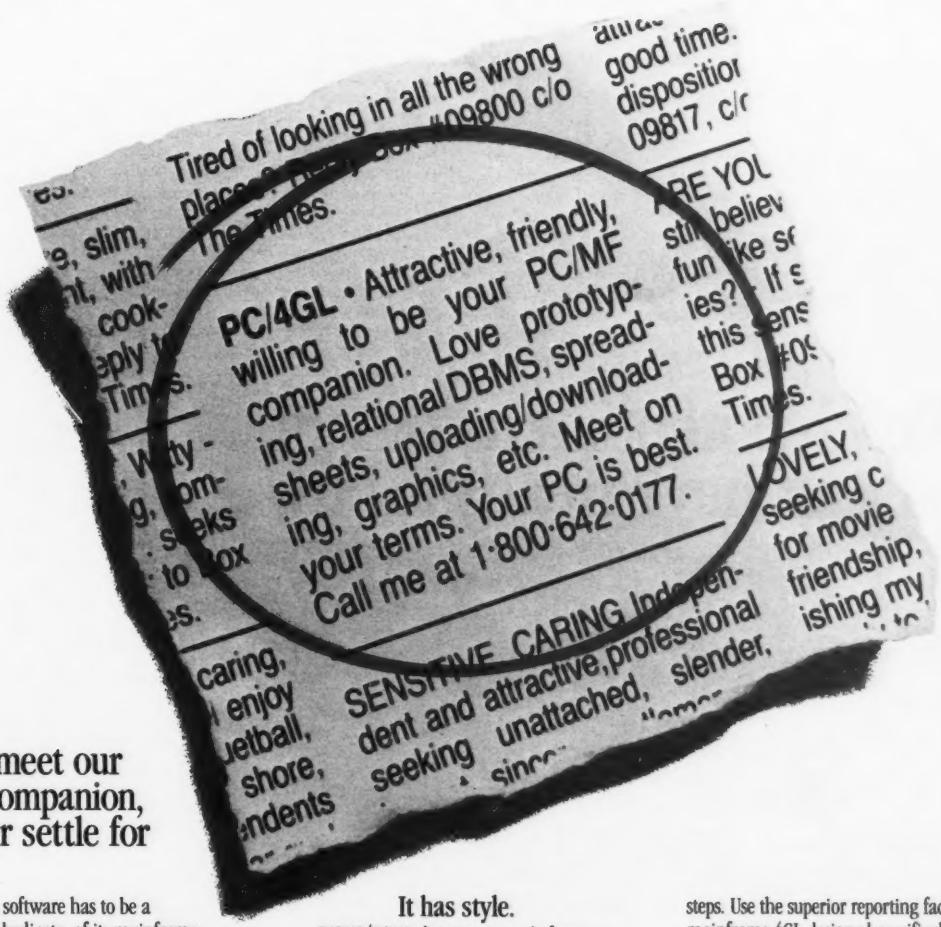
The 44-year-old Prokopis served during a crucial period for Lotus. The firm had unsuccessfully attempted to wean itself from a reliance upon Lotus's 1-2-3 for the bulk of its revenue by creating new applications such as Symphony and Jazz.

But realizing the strength of 1-2-3, the firm's core product, Lotus embarked on a new strategy. Now, rather than creating another hit product of that magnitude, the firm is positioning 1-2-3 as an operating environment and surrounding that core product with a variety of applications that provide data, accessories, a new interface and development tools.

Much of this strategy has been realized through acquisitions. Prokopis has played a key support role in seven acquisitions of products or companies, one of which has yet to be completed.

Since April 1985, Lotus has acquired four companies: Datapeed, Inc., Isys Corp., GNP Development Corp. and Graphic Communications, Inc. It has signed a letter of intent to acquire Computer Access Corp. Lotus has also bought the partial assets of Software Arts, Inc. and the complete assets of Infocenter Software, Inc.

"I learned quite a bit," Prokopis said.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MERGERS & ACQUISITIONS

Nashua Corp. in Nashua, N.H., announced that it has completed the purchase of **Lin Data Corp.**, a manufacturer of high-capacity rigid disks for storage of computer data.

Under terms of the agreement, Nashua acquired all classes of Lin stock for approximately $24 million in cash.

Harris Corp. announced it has sold the components operation of the company's Microwave Semiconductor Division in Milpitas, Calif., to **Litton Industries, Inc.** in Beverly Hills, Calif.

The terms of the cash transaction were not disclosed.

The Harris Microwave Semiconductor division was composed of two operations: components and gallium arsenide integrated circuits.

Data General Corp. has signed an agreement to purchase the technology assets of **Easinet Pty. Ltd.** in Sydney, Australia.

Data General said it has offered employment to most of Easinet's employees. The amount of the purchase was not disclosed. Easinet is a privately held software company that develops and markets engineering data base and applications software packages.

Data General and Easinet have had a seven-year business relationship during which Easinet has been a Data General OEM, independent software vendor and the developer of Data General's TO/3D engineering data base software.

Sungard Data Systems, Inc. and **Devlin Associates, Inc.** have reached an agreement in principle for Sungard to acquire Devlin.

The planned transaction is scheduled for completion by June 30.

Devlin Associates is an independent consulting firm that provides planning and educational services in the areas of disaster backup and recovery, emergency preparedness and security planning.

Teaming up

CONTINUED FROM PAGE 93

out of the computer industry, and everyone scrambled for a life raft. Announcements of layoffs came weekly, and chip companies found they had less and less to spend on research and development, which was supposed to get them back into the black.

Despite the computer industry's current resurgence and the resulting pickup of semiconductor orders, this is not exactly the time for pink champagne.

Jack Beedle, president of In-Stat, Inc., which is a a highly regarded Scottsdale, Ariz., industry watchdog, predicts U.S. chip sales will drop significantly in the second half of this year after a strong first half.

Darwinism

One reason for this predicted drop is that while more than 100 new companies will be jumping on the IBM Personal Computer- and Personal System/2-clone bandwagon this year, and each will be ordering chips for its clones, add-on boards, peripherals and other paraphernalia, only a portion of those companies is expected to survive. This shake-out would bring a decline in chip demand, according to Beedle.

Meanwhile, communications equipment sales are hindered by the uncertainty of Integrated Services Digital Network technology, still in the future. Military orders for semiconductors are expected to slow as well, due to the current demand for cutbacks in Pentagon spending.

As if that isn't enough, the U.S. economy is overdue for a recession, which would certainly affect any short-term growth of chip companies. Beedle notes that the current business expansion cycle is 55 months old — by far the longest such economic cycle in peaceful times.

These problems, along with the high costs of manufacturing and R&D and the need to strengthen U.S. industry against overseas competitive pressures, will shrink the number of worldwide semiconductor companies from 289 at present to about 100 by the year 2000, Beedle estimates. Of that 100, 10 will be giants in the industry and the rest will be smaller, niche-oriented firms.

You scratch my back . . .

Thus, with continued uncertainty in the future and economic chaos in the recent past, strategic partnerships seem to be the only solution. Semiconductor vendors are finding it fruitful to work together to take advantage of one another's technologies and capabilities. Why reinvent the wheel when you can swap secrets and share expenses?

Many of these alliances are with overseas competitors, illustrated by partnerships between Motorola, Inc. and Toshiba Corp. and National Semiconductor Corp.'s relationships with Japanese and French chip firms.

These are not the best of times for U.S. semiconductor companies, and the glory days of the late '70s and early '80s may never come again. But after the anxiety and concerns from 1985 to 1986, at least now the sleeping CEO can catch a few Zs between buzzwords.

Martin is a *Computerworld* West Coast correspondent.

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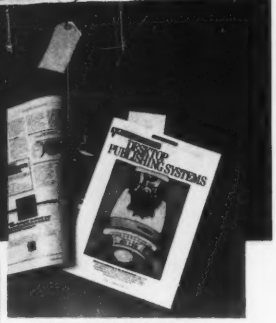

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Issue	Topic	Ad Closing Date
July 6	Manufacturing Technology	June 19
July 13	Security Products & Services	June 26
July 20	Accounting & Financial Software	July 3
July 27	Graphics Workstations & Software	July 10
Aug. 3	Communications Software	July 17
Aug. 10	DBMS for Large & Medium Scale Systems	July 24
Aug. 17	Field Service	July 31
Aug. 24	Education & Training	Aug. 7
Aug. 31	DBMS for Micros & Small Systems	Aug. 14
Sept. 14	DB2 Market	Aug. 28
Sept. 21	Hardware Roundup: Large & Medium Scale Systems	Sept. 4

Unipress

FROM PAGE 93

tag like with mainframes," Krieger says. "You can't send a salesman to sell products in the $500 to $1,000 price range."

Unipress has also set up relationships with hardware manufacturers such as Convex Computer Corp. and Pyramid Technology Corp., which market Unipress products to their customers.

The privately held company, which projects profits of $300,000 on revenue of $2.5 million for this year, says it hopes to reap the benefits of an apparent groundswell of support for Unix.

Several commercial vertical markets, such as the brokerage and law industries, are embracing Unix's ever-expanding portfolio of business-specific application packages. Moreover, almost half the federal government bids for new hardware today require the capability to run Unix.

Torrid growth

According to market research firm International Data Corp. (IDC) in Framingham, Mass., the Unix marketplace is beginning to experience torrid growth. Approximately 181,000 Unix-based computers of all classes were shipped worldwide last year, up more than 60% from 1985, according to IDG. The market is expected to grow at a similar clip this year, the market research firm projects.

Unipress's one-stop shopping strategy impresses IDC analyst Kate Komisky. "It makes sense, because a company with one or two products has a hard time getting going," she says.

So far, Unipress is best known for its Emacs text editor, which has met with success in the engineering community and government and educational institution sectors.

Last March, Unipress decided to set up a service aimed at end users to port applications to the Unix environment. So far, that business has not grown as quickly as expected, Krieger says. The reason, he notes, is that large end-user companies — at which the porting service is aimed — are slower to make decisions. "The calls are coming in, and we're getting leads, but the real interest is coming from small software companies who have no money," Krieger says.

Although the Unix market remains somewhat fragmented, with various flavors of the operating system marketed by different vendors, Unipress says it staunchly believes that more and more users will gravitate to the environment because of its portability, multiuser functionality and networking capability.

"The race is over and the technical users — at least — have spoken," Pack says.

Sanctions cut

FROM PAGE 93

The SIA asserted that there is not sufficient evidence for any additional relaxation of the sanctions.

"What we seek, as do many members of Congress, is evidence that dumping has completely ceased and Japan has opened its market to all foreign manufacturers, as it agreed to do last year," Procassini said.

Japanese officials, who consider the sanctions unwarranted, were disappointed that the Reagan administration did not fully rescind the tariffs.

Hajime Tamura, Minister of International Trade and Industry, issued a curt statement that said he appreciated Reagan's action "to some extent" but called for "an early and total lifting of the measures."

'Ought to be rewarded'

Reagan said Nakasone "ought to be rewarded" for good-faith efforts toward compliance with the U.S.-Japan semiconductor agreement. Chief of Staff Howard H. Baker Jr. said the action should provide an incentive for further improvements.

However, some Congressional leaders who support tougher trade policies with Japan said they opposed the president's action.

Senate Majority Leader Robert C. Byrd (D-W.Va.) said, "I regret that the president has decided to lift some of the sanctions on the basis of less egregious dumping for a single month."

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Susan Kennedy is a product analyst at Leasametric, a company that rents, sells, and services DP equipment all over the country. Including thousands of terminals. And if reliability is important to the average user, it's critical to Leasametric. Because everything they offer not only has to stand up to the rigors of shipping, but the extra wear and tear that rental equipment always takes. And if a Leasametric machine breaks down, so does the cash flow it generates.

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SUPER SHORTS

Mentor Graphics Corp. has filed suit against **EDA Systems, Inc.** of California and four former Mentor Graphics employees to enjoin them from sharing and using confidential information to the benefit of EDA.

The suit also seeks damages estimated at $18 million as well as injunctions against EDA from hiring the former Mentor Graphics employees.

Amdahl Corp. recently announced the offering of 1.4 million shares of common stock at $41.125 per share.

Concurrent with this offering, the company is selling 1.2 million additional shares of its common stock to **Fujitsu Ltd.**, which will own approximately 46% of the company's common stock.

NEC Information Systems, Inc. (NECIS) announced the establishment of the **Business Credit Program**, a plan that allows authorized NECIS dealers and resellers to offer products on a lease basis to corporate accounts.

The NECIS Business Credit Program will be administered by Dana Commercial Credit in Troy, Mich., according to the company.

Ian M. Ross, president of AT&T Bell Laboratories, is this year's recipient of the **Industrial Research Institute Medal.**

Ross received the medal last month at the Institute's 1987 annual meeting.

Established in 1945, the medal is presented by the Industrial Research Institute to recognize and honor outstanding leadership or management of industrial research that contributes broadly to the development of industry and to the benefit of society.

Ross was cited for distinguished leadership and dynamic management of AT&T Bell Laboratories and for producing a steady stream of innovations in information technologies. He was also honored for vision in discerning trends in information sciences.

Novell

CONTINUED FROM PAGE 93

full range of connectivity products, according to Novell President Raymond Noorda.

Burton said Novell will probably take an approach similar to Apple Computer, Inc.'s. Apple has identified and sells directly to 75 key corporate accounts but also has a second program in which account representatives work with local dealers in other corporate accounts.

The decision to go direct — one that Novell resellers have long predicted and feared — is fueled as much by the increasing complexity of Novell's product offerings as it is by end-user pressure, according to Burton.

Raise consciousness level

"We have to raise the consciousness level of our major accounts as our products get more complex," he explained. Novell will also try to assist corporate users with long-term connectivity planning, he added. Burton also said the first phase of Novell's Message Handling Service (MHS) will ship this month and will retail for $995. MHS development kits shipped in February.

Announced last fall, the initial version of MHS will reportedly use an applications interface to allow any two Microsoft Corp. MS-DOS 3.2- and MS-Net-based networks running the same application to exchange, store and forward messages on asynchronous telephone lines.

Separately, Novell recently reported that sales for its most recent quarter ended May 2 showed a 106% increase over the like quarter last year. Earnings for the period were up by 66%.

Good results

"The overall results were better than we were looking for, both in terms of revenue and earnings per share, taking into account that they [Novell] had around $950,000 of acquisition costs in the quarter," said analyst Frederick D. Ziegel of Needham & Co.

During the period, Novell acquired Santa Clara Systems, Inc. in San Jose, Calif.; CXI, Inc. in Palo Alto, Calif.; and Softcraft, Inc. in Austin, Texas.

The acquisitions are part of the company's two-tiered growth strategy, according to Ziegel. The tiers, he said, include lowering the price of networking products to stimulate demand and enhancing the functionality of the personal computer network to the user.

Ziegel said the CXI acquisition helps Novell provide communication between micros and mainframes and that the acquisition of Softcraft will allow Novell to furnish software development tools. "One risk in the growth of the networking business is whether or not the applications software development cycle can keep pace. If the applications software is not there, the potential network buyer will wait until those applications are available," he added.

Sales for the period were $42.4 million, compared with $20.6 million in the similar period a year ago. Earnings for the recent period were $4.5 million, or 18 cents per share, compared with last year's $2.74 million, or 11 cents per share. For its current quarter, Ziegel forecasts that Novell will have revenue of approximately $46 million, with earnings of 23 to 24 cents per share.

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COMPUTERWORLD

Arming for interview battles

Tips for getting what you want while still making a good impression

BY KAREN FORCHT
SPECIAL TO CW

The classic military phrase, "Never go into battle unarmed," is sound advice that should be heeded by data processing professionals contemplating a job change.

Even experienced managers cannot rest on their laurels and safely assume that they will be hired just because they worked for several years in a large, sophisticated DP shop. They must be ready to face the newest opponent — the interviewer.

Before entering the interview, one good way for DP professionals to arm for battle is to conduct a self-analysis. By taking inventory of yourself, you can gain insight into personal strengths, weaknesses, likes, dislikes and experiences.

This process can often be painful, mostly because people rarely analyze themselves — only others.

Authors Charles Steward and William Cash Jr., in their book, *Interviewing: Principles and Practices*, suggest the following questions to consider in the preinterview self-assessment:

- What are my personality, professional and intellectual strengths and weaknesses?
- What are my accomplishments and failures?
- What activities give me the greatest satisfaction?
- What do I want out of a position now and in the future?

Take stock of the market

Along with self-assessment, you should develop a resume strategy that matches your employment goals. To develop an effective strategy, you should take stock of the market and the company where you will be interviewed.

Whether seeking your first job, moving up in a similar job or changing careers, answering the following questions can help to eliminate later frustration:

- What is the future of this business, industry or profession?
- Is the industry concentrated geographically in one area?
- How will new technology affect this area?
- Are you excited about being a part of this business or industry?

If you don't know the answers, you're heading into the battle unarmed.

Take stock of the company

Find out all you can about a specific business before you send out a resume or fill out an application form. For example, investigate these areas:

- Is the company growing or stagnant?
- What is the company's position in the overall industry?
- Is the company's business philosophy consistent with your own?
- How do current and former employees feel about the company?

The resume should be brief but long enough to give an adequate picture of yourself. Overinflating your accomplishments tends to turn off the reader, and you may find yourself labeled overqualified for the job.

A good resume should describe succinctly the events, work and educational experience that have shaped your life and character. These events should draw a picture of you in the reader's mind.

Be creative in reflecting your performance ability. Too often, facts are stated so matter-of-factly that the reader's only reaction is: "So what?"

Companies are very eager to hire a well-rounded person who shows some life away from computers. Offer some information about your hobbies, skills, interests and honors.

Taking control

The interview can reinforce or nullify your resume. Be prepared for it by following a "preflight" check sheet before, during and after.

Before the interview, research the company, products or services produced, number of employees, types of positions, size, policies, salaries, benefits, length of time in existence, owners, name of hiring personnel and so on.

Be prepared to answer questions about your qualifications, goals and interest in the company. Ready one or two questions in your mind that you might ask during the interview.

> ALONG WITH self-assessment, you should develop a resume strategy that matches your employment goals. To develop an effective strategy, you should take stock of the market and the company where you will be interviewed.

Arrive appropriately dressed (Is the company conservative or trendy?). Your safest bet is to dress conservatively. Arrive approximately 10 minutes before the interview so that you can relax a little rather than rushing in at the last minute.

During the interview, maintain good eye contact, particularly when the interviewer is asking a question. If you are uncomfortable staring into the interviewer's eyes, pick a spot on the wall about an inch or two above the interviewer's head, and focus on the spot — giving the illusion of eye contact.

The interview often will begin with small talk. This early conversation is an excellent opportunity to show your friendliness, ability to speak well and your courteousness. Watch for signs for when the small talk should progress into the "meat" of the interview itself. Let the interviewer guide you.

Do not ask questions too soon about salary. That part of the job should be discussed at the end. A safe way of learning about the salary is to ask for a range, not a specific amount.

Ask questions about training, promotions and benefits. You need to portray yourself as a person interested in a career, not just a job.

Offer information about yourself that the interviewer may not ask but that you feel is important, such as your attitude toward work and how well you work with others.

After the interview is over, make a list of pros and cons of the interview. Use this analysis in developing your skills and comfort level for the next encounter.

Forcht is an assistant professor in the Information and Decision Sciences Department at James Madison University in Harrisonburg, Va.

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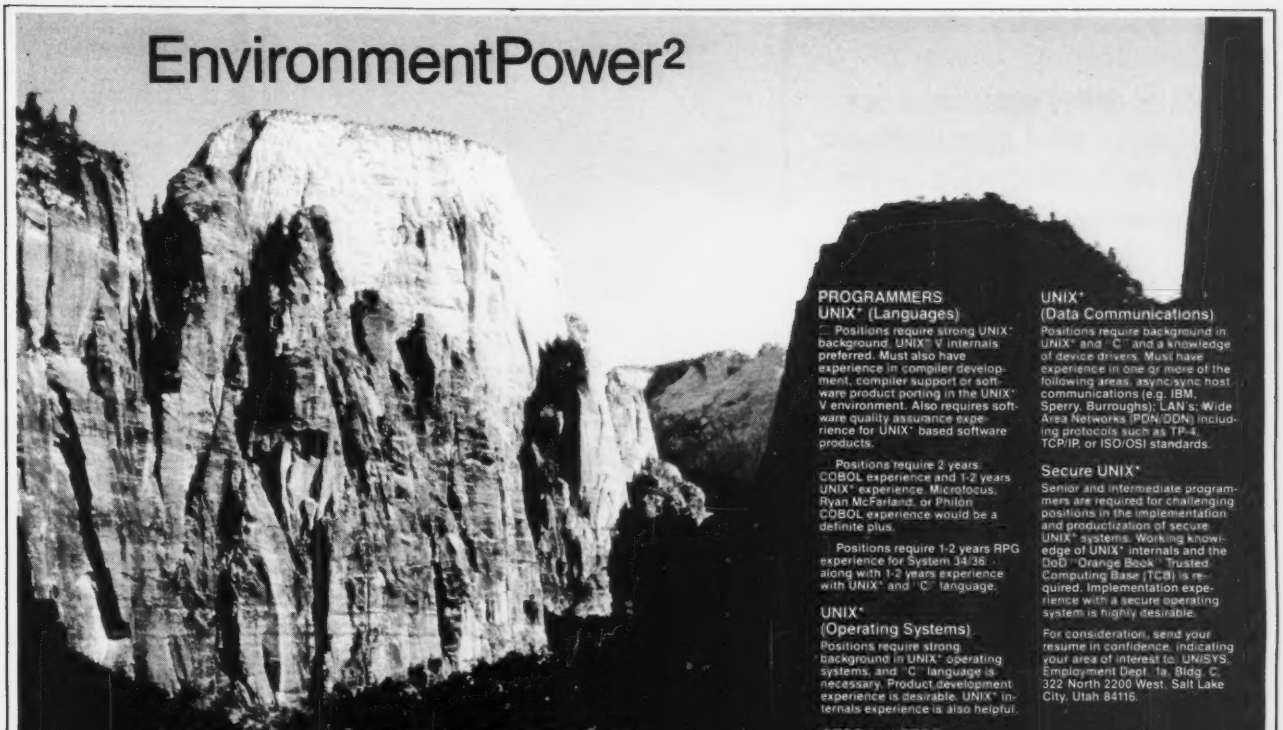

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Positions require 2 years COBOL experience and 1-2 years UNIX* experience. Microfocus, Ryan McFarland, or Philon COBOL experience would be a definite plus.

Positions require 1-2 years RPG experience for System 34/36 along with 1-2 years experience with UNIX* and "C" language.

UNIX*
(Operating Systems)

Positions require strong background in UNIX* operating systems, and "C" language is necessary. Product development experience is desirable. UNIX* internals experience is also helpful.

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Positions require strong background in Convergent Technology CTOS, Burroughs BTOS operating systems or 8086 assembly language experience. Product development experience is desirable.

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Data Processing

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Electrical Engineer

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PROGRAMMER AND PROGRAMMER ANALYST

Natural Gas Utility is seeking a Programmer and a Programmer Analyst for its corporate headquarters located in Las Vegas, Nevada. The programmer position requires two years of programming experience, with an IMS background desired, plus a Bachelor's degree in Computer Science or equivalent preferred. The Programmer Analyst position requires three years of programming experience and one year of analysis experience, plus a Bachelor's degree in Computer Science or equivalent preferred. An IMS background desired. Good written and oral communication skills required.

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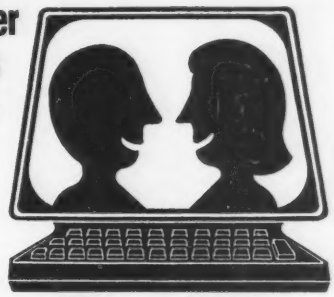

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"It worked because of Computerworld's audience," he explains. *"We're getting people with diverse backgrounds — from dedicated professionals with 2-3 years of programming experience to top MIS/DP management."*

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"Because of the new contacts that Computerworld produced on both the client and candidate sides, we decided to increase — actually double — our advertising in 1986," he adds. *"We've considered other publications, but we know that our dollars stretch farther with Computerworld. It allows us to hit our target audience,"* concludes Marc.

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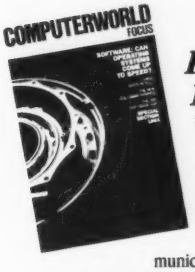

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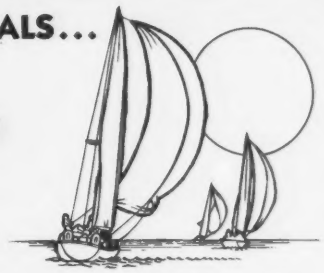

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INTERVIEWER: Send letter of application and resume to: David Fritchley, University Computing and Learning Services, Haning Hall, Ohio University, Athens, Ohio 45701.

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INTERVIEWER: Send letter of application, resume and official transcripts to: Sandy Mitchell, Chairperson, Academic Systems Specialist Search Committee, 220 Haning Hall, Ohio University, Athens, Ohio 45701.

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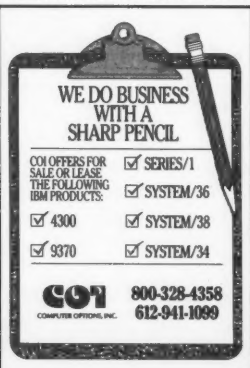

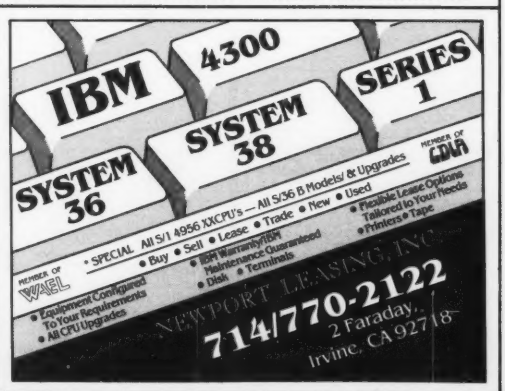
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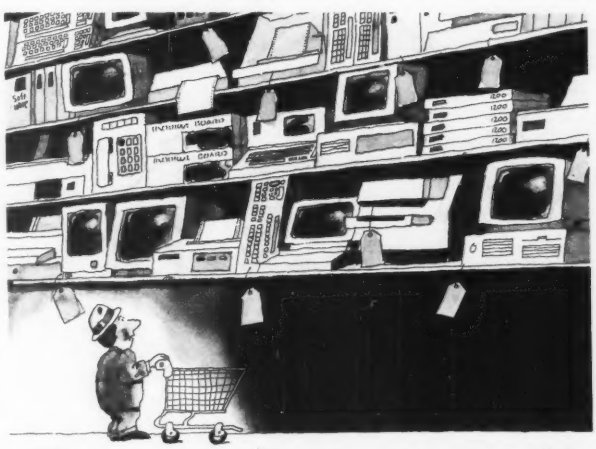

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July 6	Manufacturing Technology	June 19
July 13	Security Products & Services	June 26
July 20	Accounting & Financial Software	July 3
July 27	Graphics Workstations & Software	July 10
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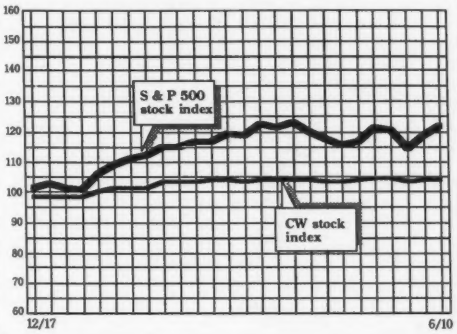

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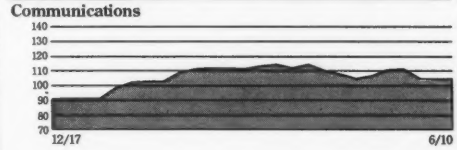
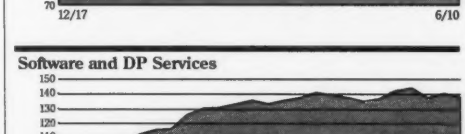
Communications	104.4	**104.7**
Computer Systems	127.3	**128.3**
Software & DP Services	140.6	**138.3**
Semiconductors	122.2	**119.2**
Peripherals & Subsystems	120.2	**121.5**
Leasing Companies	122.0	**123.5**
Composite Index	103.9	**103.9**
S&P 500 Index	118.8	**121.9**

Communications

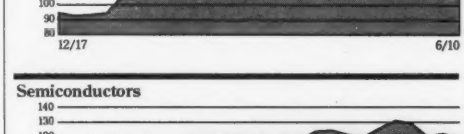


Computer Systems

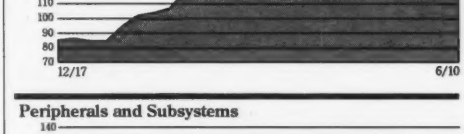
Software and DP Services



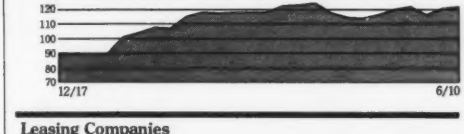
Semiconductors



Peripherals and Subsystems



Leasing Companies



CW CHARTS: SUSAN ALDAM

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 10, 1987

EXCH		52-WEEK RANGE (1)		PRICE CLOSE JUNE 10 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Communications and Network Services						
N	AMERICAN INFO TECHS CORP	101	77	84.63	+0.6	+0.7
Q	ANDREW CORP	21	14	15.00	-1.3	-7.7
Q	ARTEL COMM CORP	6	2	2.88	+0.1	+4.5
N	AT&T	28	22	26.00	+0.3	+1.0
Q	AVANT GARDE COMP INC	7	3	3.75	-0.1	-3.2
Q	AVANTEK INC	19	13	16.88	+2.5	+17.4
N	AYDIN CORP	38	18	33.25	+0.5	+1.5
N	BELL ATLANTIC CORP	77	62	67.63	+0.5	+0.7
N	BELLSOUTH CORP	46	35	39.63	+0.8	+1.9
Q	BRIDGE COMMUNICATION	27	11	24.63	+0.8	+3.1
Q	COMPRESSION LABS INC	14	4	4.88	-0.6	-11.4
O	COMPUTER NETWORK TECH	9	4	4.75	+0.3	+5.6
O	CONTEL CORP	35	27	31.00	+1.0	+3.3
Q	DATA SWITCH CORP	9	5	7.38	+0.5	+7.3
Q	DIGITAL COMM ASSOC	49	16	36.25	-9.0	-19.9
Q	DYNATECH CORP	44	27	32.25	+1.8	+5.7
Q	EQUATORIAL COMM CO	9	2	3.00	+0.1	+4.3
Q	GANDALF TECHNOLOGIES	11	5	9.25	+0.8	+8.8
Q	GENERAL DATACOMM INDS	14	8	11.63	-0.8	-6.1
N	GTE CORP	43	33	38.00	+1.3	+3.4
Q	INFOTRON SYS CORP	16	7	10.00	-0.8	-7.0
N	ITT CORP	66	44	58.38	+2.0	+3.5
N	M A COM INC	18	12	13.00	-0.1	-1.0
Q	MCI COMMUNICATIONS CORP	11	5	6.50	+0.3	+4.0
Q	MICOM SYS INC	18	10	15.75	+0.9	+5.9
Q	NETWORK SYS CORP	19	9	9.88	+0.0	+0.0
N	NORTHERN TELECOM LTD	23	13	19.88	+0.6	+3.2
Q	NOVELL INC	27	9	21.25	-3.3	-13.3
N	NYNEX CORP	73	59	67.13	+0.8	+1.1
N	PACIFIC TELESIS GROUP	31	23	25.50	+0.5	+2.0
N	PARADYNE CORP	10	4	6.25	-0.3	-3.8
A	PENRIL CORP	8	4	4.25	-0.5	-10.5
N	PLESSEY PLC	41	24	35.75	+0.8	+2.1
N	SCIENTIFIC ATLANTA INC	19	9	17.63	+0.6	+3.7
N	SOUTHWESTERN BELL CORP	41	32	37.50	+0.3	+0.7
Q	3 COM CORP	24	9	17.63	-2.3	-11.3
N	TIMEPLEX INC	41	14	35.00	+0.0	+0.0
Q	UNGERMANN BASS INC	16	7	14.63	+0.9	+6.4
N	U S WEST INC	62	45	50.63	+1.9	+3.8
Computer Systems						
Q	ALLIANT COMPUTER SYS	37	16	32.75	+0.5	+1.6
Q	ALPHA MICROSYSTEMS	7	3	3.44	-0.3	-8.3
Q	ALTOS COMPUTER SYS	17	10	11.88	-1.0	-7.8
A	AMDAHL CORP	42	16	37.13	+1.3	+3.5
Q	APOLLO COMPUTER INC	25	9	24.00	+0.1	+0.5
Q	APPLE COMPUTER INC	82	30	78.50	+0.8	+1.0
N	BOLT BERANEK & NEWMAN	60	37	43.25	-2.3	-4.9
Q	BRITTON LEE INC	7	4	4.13	+0.0	+0.0
N	COMPAQ COMPUTER CORP	51	12	46.75	-1.0	-2.1
Q	COMPUTER AUTOMATION INC	17	2	12.75	-0.5	-3.8
A	COMPUTER CONSOLES INC	12	7	9.75	-0.5	-4.9
Q	CONCURRENT COMP CORP	19	11	17.25	+0.0	+0.0
N	CONTROL DATA CORP DEL	35	20	28.63	-4.0	-12.3
Q	CONVERGENT TECH	12	4	8.00	+1.0	+14.3
Q	CONVEX COMPUTER CORP	22	8	17.38	-0.3	-1.4
N	CRAY RESH INC	136	69	101.00	-3.0	-3.1
Q	DAISY SYS CORP	13	8	8.63	-0.1	-1.4
N	DATA GEN CORP	40	25	35.13	-0.5	-1.4
N	DATAPOINT CORP	9	4	6.75	+1.1	+20.0
N	DIGITAL EQUIP CORP	175	81	163.75	+5.5	+3.5
N	FLOATING POINT SYS INC	39	9	10.25	-0.3	-2.4
N	GOULD INC	23	15	17.50	+0.6	+3.7
N	HARRIS CORP	43	27	36.50	+0.5	+1.4
N	HEWLETT PACKARD CO	67	36	62.50	-3.6	-5.5
N	HONEYWELL INC	84	58	79.75	+0.0	+0.0
N	IBM	168	116	157.75	-1.9	-1.2
Q	INFORMATION INTL INC	18	13	13.50	-0.4	-2.7
Q	IPL SYS INC	4	2	2.88	+0.1	+4.5
N	MASS COMPUTER CORP	10	5	7.88	+0.0	+0.0
N	MATSUSHITA ELEC INDL LTD	136	77	129.00	-2.3	-1.7
Q	MEGADATA CORP	7	2	6.00	+1.4	+29.7
Q	MENTOR GRAPHICS CORP	34	11	29.38	-0.5	-1.7
N	NBI INC	14	8	12.50	+1.0	+8.7
N	NCR CORP	78	42	75.00	+1.4	+1.9
N	PRIME COMPUTER INC	30	16	26.50	+0.0	+0.0
Q	PYRAMID TECHNOLOGY	11	4	10.38	+0.1	+1.2
Q	STRATUS COMPUTER	41	18	37.50	-0.3	-0.7
Q	SUN MICROSYSTEM INC	46	11	43.63	+0.0	+0.0
Q	SYMBOLICS INC	12	4	4.13	-0.3	-5.7
N	TANDEM COMPUTERS INC	75	28	66.75	+2.0	+3.1
N	TANDY CORP	56	31	40.88	+0.6	+1.6
N	ULTIMATE CORP	31	13	25.25	+1.1	+4.7
N	UNISYS CORP	125	59	119.75	+2.6	+2.2
A	WANG LABS INC	19	11	16.88	-1.0	-5.6
Software & DP Services						
Q	ADVANCED COMP TECH	6	3	4.38	-0.3	-5.4
N	ADVANCED SYS INC	23	12	22.50	+2.8	+13.9
N	AGS COMPUTERS INC	22	8	19.63	-0.9	-4.3
Q	AMERICAN MGMT SYS INC	38	13	37.50	+1.5	+4.2
Q	AMERICAN SOFTWARE INC	22	7	16.25	+1.8	+12.1
N	ANACOMP INC	9	3	8.13	-0.1	-1.5
Q	ANALYSTS INTL CORP	11	4	9.25	-0.3	-2.6
Q	ASHTON TATE	30	10	23.38	-0.6	-2.6
Q	ASK COMPUTER SYS INC	17	9	13.00	+0.4	+3.0
Q	AUTODESK INC	285	8	23.75	-0.3	-1.0
N	AUTO DATA PROCESSING	51	29	49.00	+2.5	+5.4
Q	BOOLE & BABBAGE INC	11	4	10.25	+0.0	+0.0
N	COMPUTER ASSOC INTL INC	29	10	26.00	-1.1	-4.1
Q	COMPUTER HORIZONS CORP	15	10	12.75	+0.4	+3.0
N	COMPUTER SCIENCES CORP	61	30	55.50	+1.8	+3.3
N	COMPUTER TASK GROUP INC	18	11	13.50	-2.3	-14.3
Q	COMSHARE INC	21	11	19.75	+2.0	+11.3
N	CULLINET SOFTWARE INC	15	6	12.25	+0.0	+0.0
Q	CYCARE SYS INC	17	7	7.88	+0.0	+0.0
Q	DUQUESNE SYS INC	33	12	25.75	-0.8	-2.8
Q	ENDATA INC	10	5	10.00	+0.0	+0.0
N	GENERAL MTRS (CLS E)	49	24	42.00	+1.3	+3.1
Q	HOGAN SYS INC	17	9	15.50	+0.5	+3.3
Q	INFORMIX CORP	23	7	19.25	-2.0	-9.4
Q	INTELLICORP INC	11	4	9.75	-0.5	-4.9
Q	KEANE INC	16	5	9.25	+0.0	+0.0
N	LOTUS DEV CORP	37	9	30.25	-2.9	-8.7
Q	MANAGEMENT SC: AMER	21	12	14.63	+0.6	+4.5
Q	MICRO PRO INTL CORP	8	2	6.31	-0.9	-12.9
Q	MICROSOFT CORP	128	26	103.50	-9.5	-8.4
Q	NATIONAL DATA CORP	27	16	20.63	-1.0	-4.6
Q	ON LINE SOFTWARE INTL INC	20	6	18.88	+2.3	+13.5
Q	ORACLE SYS CORP	30	7	26.00	-1.3	-4.6
N	PANSOPHIC SYS INC	23	12	21.88	-0.5	-2.2
Q	POLICY MGMT SYS CORP	30	15	23.75	-2.0	-7.8
Q	PROGRAMMING & SYS INC	13	8	10.50	+0.3	+2.4
Q	REYNOLDS & REYNOLDS CO	42	27	35.50	+1.5	+4.4
Q	SEI CORP	35	15	31.75	-1.5	-4.5
Q	SHARED MED SYS CORP	53	23	26.75	-0.8	-2.7
Q	SOFTWARE AG SYSTEMS INC	20	10	12.00	-0.1	-1.0
Q	SOFTWARE PUBG CORP	17	5	10.25	-4.9	-32.2
A	STERLING SOFTWARE INC	21	9	10.63	+0.4	+3.7
Q	SUNGARD DATA SYS INC	21	10	18.50	-0.3	-1.3
Q	SYSTEMATICS INC	30	14	27.75	-1.3	-4.3
N	UCCEL CORP	45	18	42.13	-1.5	-3.4
N	URS CORP	21	13	16.13	-0.3	-1.5
Q	VM SOFTWARE INC	45	16	25.00	-4.3	-14.5
Semiconductors						
N	ADV MICRO DEVICES INC	25	13	21.25	-0.9	-4.0
N	ANALOG DEVICES INC	24	14	20.50	-0.5	-2.4
Q	ANALOGIC CORP	13	10	11.13	+0.3	+2.3
Q	INTEL CORP	48	16	42.25	+0.0	+0.0
Q	LSI LOGIC CORP	17	8	11.75	-1.1	-8.7
Q	MONOLITHIC MEMORIES INC	19	10	17.88	-0.6	-3.4
N	MOTOROLA INC	64	34	54.50	-0.4	-0.7
N	NATL SEMICONDUCTOR	17	8	13.50	+0.0	+0.0
N	TEXAS INSTRS INC	203	103	174.63	-2.1	-1.2
A	WESTERN DIGITAL CORP	33	11	27.75	-2.0	-6.7
Peripherals						
N	AM INTL INC	9	5	6.88	+0.4	+5.8
Q	AST RESH INC	23	11	17.50	-2.0	-10.3
Q	AUTO TROL TECH CORP	8	3	6.88	-0.1	-1.8
Q	BANCTEC INC	16	6	14.75	+0.0	+0.0
Q	CIPHER DATA PRODS INC	19	10	12.63	+0.4	+3.1
A	COGNITRONICS CORP	5	2	4.38	-0.5	-10.3
N	COMPUGRAPHIC CORP	24	16	22.38	-0.6	-2.7
N	COMPUTERVISION CORP	23	10	16.38	-0.8	-4.4
N	CONRAC CORP	30	12	27.25	+0.1	+0.5
A	DATAPRODUCTS CORP	18	10	10.75	+0.3	+2.4
A	DATARAM CORP	17	7	7.63	+0.0	+0.0
N	DECISION INDS CORP	15	7	9.25	+1.4	+17.5
N	EASTMAN KODAK CO	85	52	81.75	+3.6	+4.6
Q	E M C CORP MASS	34	11	27.00	+0.5	+1.9
Q	EMULEX CORP	10	5	8.00	+0.0	+0.0
Q	EVANS & SUTHERLAND	40	20	30.25	+0.8	+2.5
Q	ICOT CORP	13	5	7.13	+0.1	+1.8
Q	INTERLEAF INC	20	8	18.00	-0.5	-2.7
Q	IOMEGA CORP	13	2	3.00	-0.3	-7.7
Q	LEE DATA CORP	10	5	6.63	-0.8	-10.2
Q	MASSTOR SYS CORP	5	2	4.50	+0.0	+0.0
Q	MAXTOR CORP	34	10	29.00	-1.3	-4.1
Q	MICROPOLIS CORP	44	14	40.75	+0.0	+0.0
Q	MINISCRIBE CORP	18	5	15.88	-1.0	-5.9
N	MINNESOTA MNG & MFG CO	140	99	133.00	+5.6	+4.4
A	MSI DATA CORP	17	10	16.25	-0.1	-0.8
Q	PRIAM CORP	5	2	4.50	+0.0	+0.0
Q	PRINTRONIX INC	14	10	12.00	+0.6	+5.5
N	QMS INC	18	11	16.50	+1.1	+7.3
Q	QUANTUM CORP	35	16	22.25	+0.5	+2.3
Q	RAMTEK CORP	6	4	4.75	+0.1	+2.7
N	RECOGNITION EQUIP INC	27	10	19.88	+1.4	+7.4
Q	REXON INC	14	5	10.50	-0.5	-4.5
Q	SCAN TRON CORP	19	11	11.50	+0.3	+2.2
Q	SEAGATE TECHNOLOGY	46	10	40.00	-3.3	-7.5
N	STORAGE TECH CORP	5	2	4.13	+0.1	+3.1
Q	TANDON CORP	8	2	6.00	+0.5	+9.1
A	TEC INC	6	3	4.50	+1.1	+33.3
N	TEKTRONIX INC	43	27	37.63	+3.5	+10.3
Q	TELEVIDEO SYS INC	3	2	2.50	-0.1	-4.8
N	TELEX CORP	102	52	78.75	+3.9	+5.2
Q	WYSE TECH	35	13	31.25	-2.4	-7.1
N	XEROX CORP	81	49	78.38	+1.8	+2.3
Q	XIDEX CORP	21	12	12.50	-0.8	-5.7
Leasing Companies						
N	COMDISCO INC	33	15	30.63	-0.4	-1.2
N	CONTINENTAL INFO SYS	14	7	13.00	+0.1	+1.0
Q	PHOENIX AMERN INC	8	3	4.88	-0.1	-2.5
Q	SELECTERM INC	8	5	5.38	+0.3	+4.9
N	U S LEASING INTL	53	38	51.00	+1.9	+3.8

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL; O = OVER-THE-COUNTER; S = SPLIT

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Got a parachute?

Investors bail out on DCA after revenue drop predicted

Investors, already jittery about the global economic situation, were not in a forgiving mood when they heard bad news last week from Digital Communications Associates, Inc. (DCA).

The Norcross, Ga.-based vendor of micro-to-mainframe products experienced a massive sell-off of its shares in over-the-counter trading Wednesday after announcing that revenue in its current fourth quarter will fall 12% to 15% short of third-quarter levels. DCA stock plummeted 11¼ points to 36¼ as 3.6 million shares changed hands, making DCA the most active stock on any market that day.

Following the typical pattern after a major drop, DCA rebounded slightly on Thursday, gaining 2¼ points to 38½.

Investors have also been jumping off the Microsoft Corp. bandwagon, partially due to uncertainty about the market success of IBM's Personal System/2. Microsoft fell 6 points Thursday to close below the 100 mark for the first time in several weeks at 97½. Microsoft, which has traded as high as 128¼, lost 11¾ points in last week's first four days of trading.

CLINTON WILDER

Shunning MIS

FROM PAGE 1

years," says Ted Stohr, chairman of New York University's information systems area. "But a lot of good jobs in MIS are going wanting."

Computerworld recently interviewed leading MIS educators as well as MIS managers around the country and discovered several critical challenges facing colleges and universities, MIS majors — continue to thrive, a majority of the MIS programs across the country have leveled off. Several have run into even harder times. A long-time program in MIS at Dartmouth College in Hanover, N.H., for example, was recently killed because of lack of student interest and financial backing from the school. Babson College in Wellesley, Mass., witnessed "devastating declines in MIS enrollment" during the past three years, says Leslie Ball, director

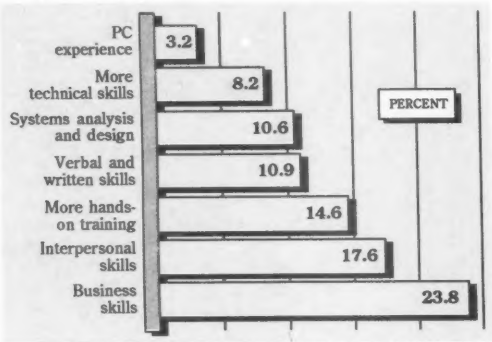
Computer science graduates: How their bosses see them

MIS departments continue to hire heavily from computer science departments, but these graduates sorely lack several key skills

• When asked the importance of the following skills for recent graduates, the respondents replied:

	Very important	*Important*	*Somewhat important*	*Not at all important*
Technical skills	48.4%	43.8%	7.3%	0.4%
General business skills	20%	55.3%	21.9%	2.7%
Interpersonal skills	51%	41%	7.9%	—

• When asked in which skills computer science graduates need improvement, respondents replied:



INFORMATION PROVIDED BY A COMPUTERWORLD SURVEY OF MORE THAN 700 MIS/DP PROFESSIONALS
CW CHART

including the following:

• Although up to 70% of the nation's business schools now offer a concentration in MIS, the best and the brightest students are opting for majors in finance, drawn by the lure of huge salaries and the high-powered lifestyle of Wall Street.

• Corporate MIS departments are seeking a balanced mix of technical and business acumen in hiring today. But the reality is that computer science grads tend to be too technically oriented, and MIS majors in business schools do not have the solid technical grounding required. Attempts to create a curriculum that provides the perfect match have met with limited success.

• A UCLA study shows that freshmen interest in computer careers has dropped dramatically since its peak in 1982, falling from a high of 8.8% in 1982 to just 3.5% in 1986.

• While some programs — notably Georgia State University in Atlanta, with more than 1,500 of the school's MIS program.

• A *Computerworld* survey of more than 700 MIS professionals revealed that nearly 40% of the respondents felt computer science programs are doing only a poor-to-fair job in training students for MIS careers.

• Finding qualified faculty to teach in the MIS programs remains difficult, and there continues to be just one qualified candidate for every three positions across the country.

• Curriculum and teaching methods vary so dramatically from program to program that corporate MIS departments are hard-pressed to know just what they are getting when hiring recent graduates.

• Curriculum in both MIS and computer science is not keeping up with the vast and rapid changes taking place in the information systems world. A recent report on MIS curriculum concludes that "MIS curriculum, and computer science programs as well, in many cases have not produced qualified and employable graduates for business environments."

The lure of Wall Street

Although the very healthiest MIS programs at schools such as the University of Arizona at Tucson, the University of Minnesota in Minneapolis and Georgia State continue to attract plenty of applicants, the lure of Wall Street is taking a toll at a majority of schools.

"When I look at the kind of bright people who were entering our field five years ago and are not anymore, I ask what's happened to cause this decline," McLean says. "The first one is clear: The action is in finance. It is sucking up people even though they all can't be placed. The number of jobs in MIS is four times that of finance, but those $60,000 or $70,000 starting salaries dazzle them."

Students are not the only ones longing for the six-figure potential. Faculty and potential faculty are opting for other, more lucrative careers as well. J. F. Nunamaker, director of the MIS program at Arizona, insists that the salary gap between academia and industry is closing fast and points out that a starting assistant professor can expect a $45,000 nine-month contract with a guaranteed summer contract of another $15,000.

Michael Lawson, director of Boston University's master of science in MIS program, agrees the gap is closing but points to a young faculty member who recently left campus for a financial position in New York, a job starting at $150,000.

"You are asking students and faculty to be profit-oriented because they are here in the business school, and they say, 'I see the biggest profit in going elsewhere,' " McLean says.

In addition, the widely publicized computer slump proved devastating to MIS programs. IBM, for example, reportedly hired 6,000 college grads two years ago. That figure dropped to 1,000 last year and to virtually none this year. Although companies in other industries are beating down doors to find quality MIS people, that message has not been heard over the trumpets of doom within the industry itself. And although the need is great in MIS, the profession lacks glamour, and salaries have not risen to match the demand.

UCLA's McLean

A dearth of computer science and MIS graduates in the Southwest, for example, has lead to the formation of a 60-member corporate cooperative in Dallas to try to attract graduates from other regions to come work in that city.

"We formed the co-op to put on a united front to attract DP talent to this area," says Richard Bell, staffing manager for high-tech consulting for Arthur Young in Dallas. "When the oil glut hit here, it really hurt the MIS profession."

The schools that have established close ties to the local corporate community and draw on those ties for counsel and future employment tend to have weathered the early storm clouds of this crisis (see story page 121).

Most of the successful programs have created visiting committees of local businessmen to advise both faculty and students about MIS needs. Many local companies provide internship or co-op programs for students who can use that experience to find jobs with that company upon graduation. Working with local businesses, however, can be a mixed blessing. McLean points out that if businessmen are taking the time to advise, they expect to be listened to, and MIS programs are hard-pressed to accommodate all recommendations.

"We have some spirited meetings in which we discuss how much programming, how much technology is necessary," McLean recounts. "And one MIS guy will say, 'These people will be managers, but I expect them to be competent Cobol programmers; our whole shop is Cobol, and if they are going to manage Cobol programmers, they should be able to do anything they ask their subordinates to do.' Now, I know of two firms,

Grants help tailor MIS grads

The current crisis in MIS education was not totally unanticipated. IBM, for example, noted three years ago that MIS education was facing a quandary, so in 1985 the firm provided $27 million in grant money to 13 graduate schools of business to foster programs in MIS. The company currently encourages its own MIS professionals to gain visibility and promote the profession on campuses around the country.

IBM, under the guidance of Charles Bowen, director of plans and program administration, foresaw this impending problem in the early 1980s, even as interest in computer careers was swelling. "We could see that MBAs didn't understand systems and computer science majors didn't understand management and business," Bowen says. "In 1983, we decided to hold a competition for graduate schools in this area."

Promising $27 million in grants and equipment, Bowen and his colleague John Nayden, an IBM consultant, met with business school deans around the country in 1983 to discuss needs and concerns about MIS education. "People figure that we know something about this," Bowen says, "so we hoped the grants would legitimize this area of teaching a bit."

Bowen and Nayden realized that a large, unfilled gap existed in this academic discipline — there was a 10-1 ratio of tenure track openings to qualified applicants in MIS at the time — and the grant program could help alleviate some of the problem. IBM received 212 applications, gave out 40 planning grants and then awarded the 13 major grants in 1985. While the IBM awards have significantly affected the schools that received them, there is more than a bit of irony in the newly created relationships. According to the University of California at Los Angeles's Ephraim McLean, IBM's own MIS function hires only computer science graduates.

"We meet with an IBM MIS rep twice a year, and they tell us they need better people," McLean says. "So we ask where they get their people and they say 'computer science departments.' And maybe they are looking under the wrong rock. They should be hiring from the very business schools they just finished funding. IBM does hire lots of our grads, but they go in as marketing reps or systems engineers, not into IBM's own MIS function."

Don Rully, IBM's director of information systems, acknowledges that the company traditionally hires computer science majors. "The MIS graduates haven't been there, the numbers were very limited," he says. "It's only recently that the programs have started turning out people we can hire."

GLENN RIFKIN

both good friends to UCLA and leading employers, who will not hire our grads because they have insufficient technical depth."

In addition, the proliferation of microcomputers in both high schools and colleges has dramatically changed students' perceptions about computing, producing a cocksureness that an understanding of basic personal computer packages insures an ability to run any type of MIS function.

"We do see that some employers view MIS as a vanishing skill because all business grads will know more about comput-

NYU's Ted Stohr

ers," says David Naumann, director of the MIS program at the University of Minnesota.

Naumann's colleague, Jim Wetherbe, who runs Minnesota's MIS Research Center, adds that there is confusion among employers as to what they are looking for from universities.

"We periodically survey Fortune 100 companies and ask what they are looking for in an MBA for MIS," Wetherbe explains. "And there is a lot of confusion out there about whether they want a computer science grad or an MBA with a concentration in MIS. There's a definite overlap, and that causes confusion."

Adding to the problem is the fact that the study of MIS in academia has just recently come of age. In fact, that study closely parallels the development of the field itself, and therein lies much of today's confusion and uncertainty surrounding the academic discipline.

"We constantly have to remember that this course of study is a baby," Lawson says. "Let's not ask it to behave like a 200-year-old discipline."

Those who can't?

From the computer science point of view, there is also the perception that MIS is an undefined occupation. Stuart Reges, assistant chairman for education in Stanford University's department of computer science, points out that the perception is that "people in MIS are just not quite good enough technically." Reges, who counsels undergrad computer science majors at the Stanford, Calif., university, says he would not recommend a path into an MIS program. "I'd rather recommend a computer science undergraduate degree along with a general MBA," he says. "Or I'd suggest studying software engineering on a graduate level. The future of MIS is simply not clear; programs like that have trouble finding a home."

Indeed, while many computer science majors eventually find themselves working in MIS as programmers, the far more attractive pot of gold for them lies in development work for leading computer manufacturers such as IBM, Digital Equipment Corp. or Apple Computer, Inc.

"We keep seeing a very heavy technical engineering orientation in the computer science grads," says Mike Heschel, corporate vice-president of information resources for Baxter Travenol Laboratories, Inc. in Deerfield, Ill. "The curriculum tends to be too technical. That's fine if you want to design computer systems, but MIS doesn't necessarily need that skill."

Curriculum, in fact, constitutes a major focus of concern in this current crisis. Unlike age-old disciplines such as math, the rapidly changing high-tech environment renders many MIS courses obsolete in less than five years. Within rigidly structured academic departments, it is sometimes extremely difficult to implement such changes, and even if that is possible, finding savvy faculty to teach the new courses presents another high barrier to clear.

Several organizations, such as the Data Processing Management Association and the Association for Computing Machinery, have for many years offered an outline for a model curriculum in MIS.

The model curriculums offer a varied mix of technical and business courses. But, according to Professors Andrew Targowski and Judy Yaeger of Western Michigan University and Donald Carr of Eastern Kentucky University, that model is rarely more than an unattainable goal for most business schools.

"For those colleges which are accredited by a board, there is already a rigorously defined curriculum required as part of the business administration degree, which leaves only a limited number of credits left for work in the major area of concentration," Targowski, Yaeger and Carr wrote in a recent report on MIS curriculum.

And program directors agree that the very nature of the field makes MIS as an academic discipline "mushy" and difficult to research. It thus draws scorn from other academic departments, and committing to such a course of study for both students and faculty is considered risky. At most universities, tenure approval as well as the initiation and expansion of new programs is dependent on faculty committees. These committees are often unwilling to commit resources to "unfocused" disciplines such as MIS. Young faculty are finding it a rocky road to tenure or full professorship in an MIS concentration and therefore opt for more established programs in which they can concentrate on building their research credentials.

At Stanford University's prestigious Graduate School of Business, for example, there is little emphasis put on MIS as an area of study, according to Charles Bonini, professor of management science. "I'm embarrassed when people ask me about it because I believe MIS is important, and I think we should do more. But our tenure track is dominated by research activities and contributions, and the research effort in MIS has simply not been there," he says.

"We set up our program as part of liberal arts, and it just didn't belong there," says Tom Kurtz, chairman of the computers and information systems program at Dartmouth College, a program that will cease to exist next year. "The business school was reluctant to include the program and didn't recognize information systems as an important ingredient of the school."

"MIS is facing the same thing that operations research faced 25 years ago," adds William Dill, president of Babson College, a small business college outside Boston. "Operations research was supposed to provide a relevant set of tools to management, provide an avenue to jobs, and there were promoters on the faculty pushing the program. But it sputtered out as an academic area because it was difficult to quantify, and the electives that made up the field gradually melded into other disciplines. That may happen to a degree with MIS."

The directors of MIS programs around the country disagree. MIS is, in their minds, a critical avenue of study. But they understand the realities of academia and urge persistence and patience. "MIS departments across the country have difficult times fitting into business schools," Boston University's Lawson says. "It is considered too technical or just another way of teaching policy. That's why, for schools that are serious about this, it takes creative management, careful leadership and an ability to realize that this might be a little messy and painful but a willingness to wade in anyway."

Lawson expects to see a shakeout in the education community to mirror the shakeout in the computer industry of the past few years. "You'll see some schools try to get into this area, and you'll see other programs close," he says. "But what will be successful is very simple. You have to have a substantive, multiprogram approach to MIS education — not a single program trying to meet all the needs. The programs must be relatively modest and can't be thought of as a panacea; and they must have focused agendas to meet the real needs of the business community. That's the approach that will ultimately pay off."

Next week: What the corporate user wants.

Where MIS is still the BMOC

Despite the evidence of declining interest in MIS among America's college students, several MIS programs continue to thrive. At MIT, for example, Tom Magnanti, the George Eastman professor of management science, insists that MIS is among the most popular areas of concentration at the prestigious Sloan School of Management.

The MIS program at the University of Arizona, under the management of J. F. Nunamaker, offers a full contingent of concentrations: an undergraduate degree, two master's degrees (an M.S. and an MBA) and a Ph.D. The area of study is so popular, according to Nunamaker, that 3,600 business students annually take an introduction to information systems course. The Ph.D. program received more than 200 applications for 10 positions open for the 1986-1987 academic year.

James A. Senn

Undoubtedly, however, the most successful MIS offering is at the College of Business Administration at Georgia State University in Atlanta. In an era when the number of applications to MIS undergraduate and graduate-level programs is dropping significantly, the Computer Information Systems program at Georgia State boasts more than 1,500 MIS majors on campus.

According to James A. Senn, chairman of the computer information systems department, the school has 800 undergraduate majors, 700 master's degree aspirants and 29 doctoral candidates in MIS. In addition, the department offers 25 different courses in MIS with 21 full-time faculty members, which is more than any other program on campus offers.

The 22,000-student university, according to Senn, is dominated by the business school, and in turn, "MIS dominates the business school."

Senn says he believes there are three critical reasons for Georgia State's success in MIS:

1. Interaction. There is significant and far-reaching interaction between the MIS program and the local business community in Atlanta.

2. Research. There is an emphasis on MIS in the school's research activities.

3. Support. The program enjoys "tremendous" support from the university. "The president is a major cheerleader for our program," Senn says. "The university is willing to put the [necessary] resources into the program to make it work."

Senn is credited with bringing the Georgia State program together during the past four years, answering the question of whether it should be more technical or more management-oriented. Though some business school MIS directors dismiss Georgia State's department as simply a glorified programming school, Senn disagrees. "We decided we could do both quite well, and that's what we've focused on," he says.

According to Ephraim McLean of the University of California at Los Angeles's Graduate School of Management, the secret of Senn's success is in the fact that the program is a separate department within the business school rather than just an area of concentration for all MBA candidates to consider. "He has an appropriate model there," McLean explains. "Industry can look there and know that each graduate has [taken] Cobol and data base management and a series of course offerings geared to MIS. They know what they are getting when they hire one of his grads."

Senn takes it a step further. Because the program is a well-supported one, "we don't have to constantly justify our existence like other programs do," he says.

And most of all, the program fosters a strong and cooperative relationship with local business. "Atlanta is our campus," Senn says. "And we are putting together a special board of advisors from the business community just for the Computer Information Systems program."

GLENN RIFKIN

PS/2 orders surge

Model 30 is big favorite among dealers

IBM dealers have been ordering IBM Personal System/2s in large numbers, according to a survey of the invoices of 500 computer specialty stores conducted by IMS America Ltd. in Ambler, Pa. The survey, however, did not indicate the sell-through rate of the machines.

The survey covered the entire month of April — the first month the PS/2 Models 30 and 50 shipped. The Model 60 was also covered, although it did not ship in April.

Of the PS/2 line, the Model 30 was the overwhelming favorite of dealers, with a projected $22,382,000 worth of the machines ordered. The Model 30 also commanded 18% of the dollar volume of all 16-bit machines ordered by dealers in April, the survey found. The PS/2 Model 50 had a 9% share of dollar volumes; $11,526,000 worth of the machines were ordered. The Model 60 had a 6% dollar share, with orders totaling $7,415,000, the survey said.

Compaq Computer Corp.'s Deskpro 286 had an 11% dollar share, with orders totaling $2,227,000.

Diskless PS/2

FROM PAGE 1

American Airlines will use a local-area network (LAN) tied to a file server running Novell, Inc.'s file-server operating system, a source close to both firms said.

The diskless Model 30s boot from the file server and will access IBM host computers through the host gateways that will reside on the file server. While American's application is based on IBM's PC-DOS, it does require host-data access.

The diskless personal computer is a fairly new concept that has emerged with the growth of LANs, host connectivity and increasingly sophisticated PC-based file servers. Firms such as 3Com Corp., Santa Clara Systems, Inc., NCR Corp. and Earth Systems currently offer diskless PCs to corporations interested in intelligent workstations with no local storage.

The Model 30 — list-priced at $1,695 but available to large corporate accounts at volume discounts of as much as 40% — would, in a diskless version, allow DP/MIS to control the data and applications that end users access from a host computer.

Despite the advantages of a diskless PC, there are also drawbacks. An office automation manager for a corporation that buys large volumes of micros claimed that a PC with no local storage runs contrary to the whole thrust of personal computing, which is to provide the end user with independent computing power.

But for highly specific applications, such as an airline reservation system or insurance agencies, diskless PCs provide access to host or file-server data while insuring data integrity.

'Are they a good thing?'

Robert M. Metcalf, chairman of 3Com, claimed last week to be delighted that IBM is offering a diskless workstation, even if it is not offered through IBM's entire distribution channel. "The major argument of late [against diskless workstations] has been: 'Are they a good thing?' The IBM stuff is helpful," said Metcalf, adding that it will come down to whose product is better.

According to Metcalf, the major reason for having an intelligent workstation, as opposed to a terminal, is to run PC applications. "Lotus [Development Corp.'s] 1-2-3 runs on our 3Station. It doesn't run on [Digital Equipment Corp.] VAXs or [IBM] System/36s," Metcalf said. "Another reason is price/performance."

According to Metcalf, diskless PCs on a LAN can provide as much as 10 times better price/performance than a host-based network of terminals.

Besides its limited use as a diskless workstation, the Model 30 is also finding its way into some corporations as a full-featured desktop system. These inroads are being made despite widespread market perception that the Model 30 is a low-end machine suitable for home and small business.

In fact, the machine has been criticized for its low-end Intel Corp. 8086 microprocessor, which will not allow the Model 30 to run IBM's OS/2 operating system when it becomes available next year. As a result, some in the industry have called the Model 30 a dead-end machine.

OS/2: Not for everyone

But not every user needs to run OS/2, an expensive operating system that will require new applications software, large random-access memory, a hard disk drive and an Intel 80286- or 80386-based machine.

For many corporations, terminals are no longer appropriate for distributed applications that are being implemented, and a low-end replacement such as a Model 30 is the perfect solution.

"A clerical person doesn't need an IBM Personal Computer AT," said one DP project manager at a large corporation who noted that the Model 30 is an ideal replacement for existing terminals. The manager said he is mainly purchasing Model 30s with one floppy drive and a 20M-byte hard disk. He said he does not have any inclination to move toward a diskless version.

Ace Hardware Corp. is another Model 30 customer. "We are not looking to replace terminals at this point, but we are buying Model 30s and 50s," said Don Schuman, manager of information systems for Ace Hardware.

Ace is purchasing Model 30s in larger quantities than the more sophisticated Model 50 as a replacement for IBM PC XT purchases and is not currently interested in diskless workstations. "The Model 30 is a lot faster than the XT and costs less," Schuman said.

Senior Editor Ed Scannell contributed to this report.

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INSIDE LINES

Too cold in the Northeast? DEC Vice-President Jeffrey C. Kalb, a top engineering executive who managed the development of the Microvax II, will leave the company this week. A six-year DEC veteran, Kalb intends to pursue a general management position with a smaller company or start-up, a DEC spokesman said. He is considering a return to the West Coast, his former residence.

The times they are a-changin'. Formerly loss-plagued Hogan Systems, now profitable and happily ensconced under IBM's marketing wing, is fast becoming the preferred employer in banking software, according to industry sources. Hogan is reportedly fielding resumes from professionals at SEI, Electronic Data Systems, Martin Marietta and, to no one's surprise, Uccel. SEI and Martin Marietta are both former employers of Hogan CEO Larry McTavish, who last week rose from president to chairman in recognition for engineering Hogan's turnaround.

SAA-y it is so! According to preliminary Systems Application Architecture documents, RPG 3, the programming language used with the IBM System/38, will be the fourth programming language included under IBM's SAA. The other languages are Cobol, Fortran and C. The language used to program System/36s, RPG 2, is not mentioned in the documents.

I've got a bridge in Brooklyn . . . Those who believe a vendor's marketing budget is often a black hole received some real-world evidence last week when NCR sued one of its former advertising managers and three marketing firms for fraud. NCR charged that the manager induced the company to, among other things, pay $266,000 for 20 market research studies it never received and $260,400, or far above market value, for promotional calculators and tape recorders. NCR is seeking triple damages of $900,000.

No comment. The dry spell of Apple Macintosh SEs the last couple of months was caused, one corporate account has been told, by Apple's underestimation of demand for the hard disk-based version of the system. Apple told the user it anticipated a high demand for the floppy disk-based version of the system and set up its manufacturing facilities to produce them in volume. Swamped with orders for the hard disk-based version, the company had to cease manufacturing to change operations to produce the hard-disk systems. Asked if he was surprised that Apple did not better anticipate demand for the hard disk-based system, one MIS manager said no. "You have to remember Apple is still oriented to the low end of the market," he said.

We stock restock. Two dealers last week said IBM offered to waive the 5% restocking fee on PC ATs, making it easier to return the machines and presumably restock with PS/2s. Both dealers and customers also reported last week that IBM is offering aggressive discounts of 40% to 45% on PS/2s to corporate customers ordering in large (more than 1,000 units) quantities. IBM did confirm last week it has stopped taking orders on all but two models of its older line, the PC AT 339 and PC XT 286. One Computerland dealer said, however, that IBM told him it would stop taking orders on the AT 339 once the company started producing the PS/2 Model 60 in volume sometime this summer.

Not waiting for Godot. Ansa Software hopes to exploit the protected-mode capability of Intel 80386-based machines by the end of the year. Rather than waiting for OS/2, IBM and Microsoft's protected mode operating system for Intel 80286 machines, Ansa has turned to tools from Phar Lap Software and Softguard Systems that will allow Ansa's Paradox data base to exploit memory beyond 640K bytes. On another front, Ansa is slated to announce Tuesday a joint marketing relationship with 3Com, under which customers of 3Com's LAN product will receive discounts on the new multiuser LAN version of Paradox.

Ready to lap the field. Samsung Semiconductor and Telecommunications is expected to ship a laptop computer with a 16-MHz Intel 80386 processor late this year or early next year. No formal price has been set.

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